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An analysis of the allocation of FEMA public assistance funds along the U.S. Gulf Coast following Hurricanes Katrina, Rita, and Wilma

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AN ANALYSIS OF THE ALLOCATION OF FEMA PUBLIC ASISTANCE FUNDS ALONG THE U.S. GULF COAST FOLLOWING HURRICANES KATRINA, RITA, AND WILMA

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ABSTRACT

Due to the effects of global climate change, natural disasters such as hurricanes are increasing in terms of both intensity and frequency. During the record-breaking hurricane season of 2005, Hurricanes Katrina, Rita, and Wilma struck the U. S. Gulf Coast, affecting areas from Texas to Florida and causing billions of dollars in damage. This study examines the allocation of FEMA Public Assistance across the affected Gulf of Mexico states, what factors account for variation in in assistance allocation, what are the priorities for recovery among county leaders and what obstacles they have encountered since 2005. This study includes 136 counties and seven independent variables. The analysis includes bivariate correlation and multiple regression analysis, and a brief survey that was sent out to the Emergency Management Agency Director in each county of the study area. The results show that the level of damage and amount of poverty within a county were strong predictors of Public Assistance allocation. Debris Removal and Infrastructure projects were the highest overall priority for communities and the most common obstacle faced by the local government was difficulty in getting a firm commitment from FEMA regarding the eligibility of a project. These results have important implications for future disaster management that will face ever-evolving risks.

CHAPTER 1: INTRODUCTION

1.1 Problem Statement

Coastal areas in the U.S. and around the world are experiencing coastal hazards more frequently and at a higher cost. Economic losses from these coastal hazards, including storms and floods, are growing due to increases in the coastal populations and the value of human assets, especially in high-income countries (Wilby et al., 2012). In fact, it is estimated that the economic costs of natural disasters in general has increased 14-fold globally since the 1950s. In the U.S. alone, natural disasters cost government, insurance companies, and victims about $20 billion a year. However, it is not just the costs of assets causing this rise in natural disaster-related spending. The frequency and intensity of hurricanes and other coastal hazards, such as flooding, are increasing as well. This is making the situation that much more severe. It has been observed that in the North Atlantic, hurricane frequency and intensity has been increasing since 1995. During the hurricane season of 2005 alone, the records for number of named storms and number of hurricanes were exceeded, with 27 named storms, of which 13 became hurricanes (Masozera et al., 2007).

On August 29, 2005, Hurricane Katrina struck the coasts of Louisiana and Mississippi as a Category 3 hurricane. It affected about 1.5 million people across 90,000 square miles of the Gulf Coast including parts of Louisiana, Mississippi, and Alabama (GAO, 2006). To make matters worse, Hurricanes Rita and Wilma followed in the months after and affected areas across the Gulf Coast from Texas to the Florida panhandle. Hurricane Katrina alone cost more money and took more

lives than any other single storm in U.S. history. Probably the most highly affected city, New Orleans, Louisiana experienced property damages estimated at $81 billion (Herron et al., 2012). Losses were also great in terms of economic impacts, which for Mississippi and Louisiana alone could exceed $150 billion (Toldson et al., 2011).

1.2 Research Goals and Objectives

In order to take a closer look at how FEMA handled the 2005 disasters, this study aims to examine the FEMA Public Assistance Grants distributed to the Gulf Coast following Hurricanes Katrina, Rita, and Wilma in terms of the amount spent per county/parish. The research questions are: 1) How was FEMA Public Assistance allocated across the affected Gulf of Mexico states? 2) What factors account for variation in assistance allocation? 3) What are the priorities for recovery among county leaders and what obstacles have they encountered since 2005? The study area will include 136 counties across Texas, Louisiana, Mississippi, Alabama, and Florida who experienced damage from these hurricanes to at least ten housing units within the county (Figure 1.1). This will include 22 counties in Texas, 37 parishes in Louisiana, 48 counties in Mississippi, 11 counties in Alabama, and 13 counties in Florida. Some other counties outside of the damaged areas also received Public Assistance funding for reasons such as housing refugees. Because these counties did not use the funds for actual recovery activities, they will be left out of this study.

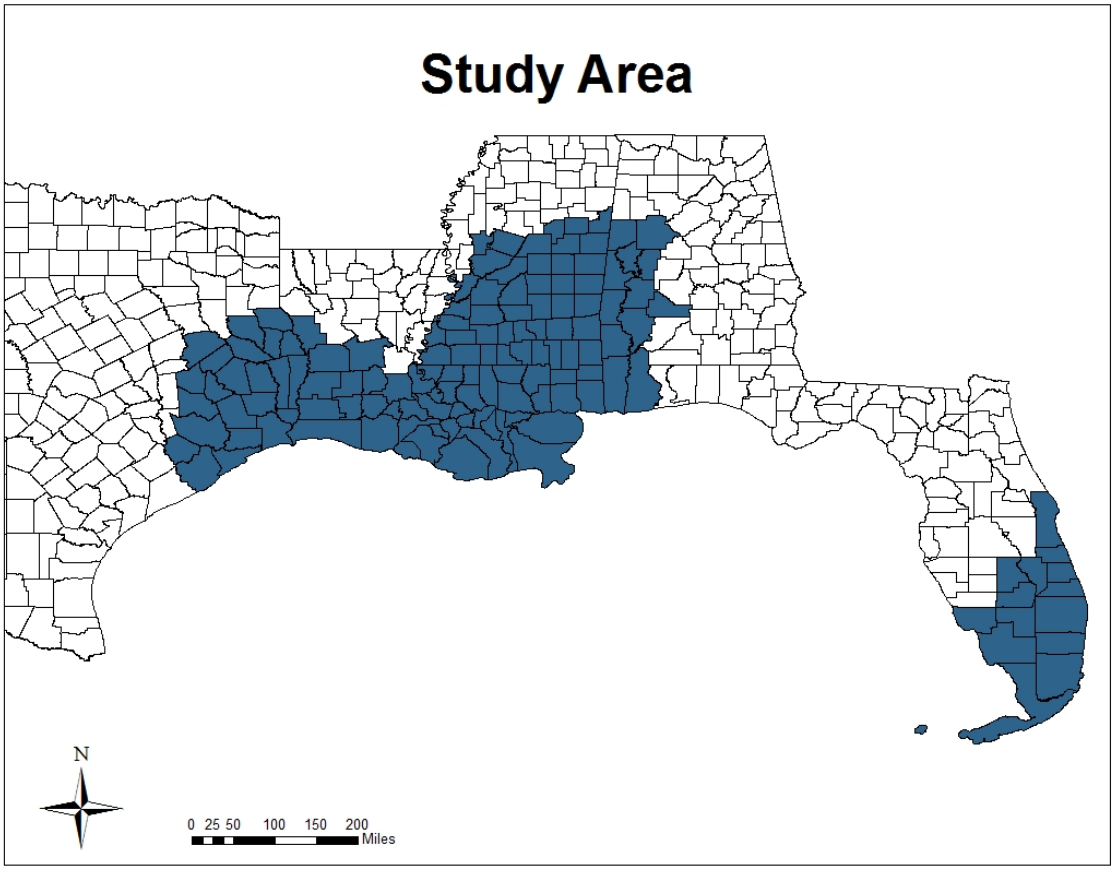


Figure 1.1 Counties Included in this Study

The Public Assistance funding amount will be compared with levels of damage in the county/parish in terms of number of housing units severely damaged and other factors influencing the socioeconomic status and levels of social vulnerability and adaptive capacity within the population of the counties/parishes. This will be done to determine whether damage was the major factor affecting recovery fund distribution or if there are other factor(s) that seems to have an affect on who was able to get recovery funds from FEMA. Although the Community Development Block Grant program was also a major source of funding for those recovering from these hurricanes, those funds will not be included in this study. This is because they were administered through HUD and each individual state was

able to distribute the funds according to their own set of requirements. This would make any quantitative analysis between states difficult. Although the FEMA Individuals and Housing Program (IHP) funds are targeted more toward individuals in disaster-affected areas, this will not be used because the data for these funds is unavailable.

A brief survey of county/parish officials is conducted in order to determine what rebuilding activities were a top priority and whether or not those activities were successfully completed and what, if any, obstacles were faced by the county/parish government in getting recovery funds and carrying out the recovery process as a whole. This will be done in order to determine where more attention needs to be given in terms of planning for disasters in the future. If efforts can be targeted at those most vulnerable to these events, we can improve our overall disaster management.

1.3 The 2005 Hurricane Season

1.3.1 Disaster Response

In response to the horrific hurricane season of 2005, Congress appropriated almost $88 billion through four emergency supplemental appropriations acts between August 2005 and June 2006 (GAO, 2006). Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), the Federal Emergency Management Agency (FEMA), which is within the Department of Homeland Security (DHS), is responsible for the management of recovery efforts and funds within the federally declared disaster affected areas. The Stafford Act guides the process of disaster declaration and relief expenditures, which come from what is known as the

President's Disaster Relief Fund (Garrett and Sobel, 2003). The first emergency supplemental appropriation act was enacted four days after Hurricane Katrina struck land and provided $10 billion. The second, enacted 6 days later, provided an additional $50 billion to FEMA. However, in December of 2005, Congress rescinded $23.4 billion of the funds from FEMA and instead gave it to other agencies directly. Overall, $88 billion were given out to 23 federal agencies by June 2006 (GAO, 2006).

Now, seven years later, FEMA's performance in managing the recovery is widely considered inadequate. However, there is no clear answer as to why this is so, although there have been several possible explanations presented. Some of these include the lack of communication between governments at various levels and a lack of preparation and coordination by FEMA as a whole (Herron et al., 2012). Additional issues experienced by FEMA include financial fraud, which eventually resulted in the arrest of FEMA employees, and general mismanagement of federal money. This led to contracts awarded to inadequate and sometimes dangerous companies who were favored for one reason or another (Jurkiewicz, 2009). Additionally, the director of FEMA at the time, Michael Brown, had very little experience in disaster management. However, it was not just FEMA that poorly managed the 2005 hurricane season. The state and local governments in the affected areas were ill prepared for such events. In many cases there were not adequate plans regarding transportation, housing, and law enforcement that such events require. These combined inadequacies led to the poor coordination and overall mismanagement of the recovery process as a whole (Roberts, 2006).

There has also been evidence that politics possibly played a role in state and local government's disaster management and ability in securing federal funds. This is particularly evident when Mississippi and Louisiana are compared to one another in terms of damage and amount of money received from the federal government, in part due to Mississippi's then-Governor, Haley Barbour's political ties in Washington (Waugh Jr., 2009). In Louisiana in particular, cultural and ethical conditions within the state and its government have also been cited as reasons why federal aid was lacking there (Jurkiewicz, 2009). Political influences on FEMA fund allocation are nothing new, unfortunately. During the 1990s, for example, disaster funds flowed in larger abundance to districts considered politically important due to an upcoming election for either the President or those on the FEMA oversight committee (Roberts, 2006).

Another major problem experienced by FEMA was the lack of accountability in their spending. In fact, the Government Accountability Office (GAO) reported that the cost of misappropriation and abuse of funds was almost over $2 billion (Boettke et al., 2007). Also, despite the large amounts of money being sent out, there was no government-wide process for gathering information from all the involved agencies regarding the amount of money spent, the location of the spending, or the purpose (Singer, 2006). Even though Congress stipulated that weekly reports had to be made by FEMA on the topic of the use of the $88 billion and progress in recovery, the information proved to be relatively useless since FEMA lacked information from the other 22 agencies that were currently handling federal disaster funds as well (GAO, 2006). In addition, local officials experienced difficulties when attempting to

complete recovery projects funded by FEMA. One specific problem experienced by many local governments was getting some projects initiated due to delays caused by the high turnover rate of FEMA staff. This would cause decisions to be reversed and other inconsistencies during the process of determining whether or not a certain project was eligible for funding and for how much it would be eligible. Another was the inability of some localities to afford matching funds required by FEMA on longer-term projects. The federal government would ultimately pay 90% of the bill but the local government would be responsible for the remaining 10%. As can be imagined, in some poorer areas, there was not enough money to pay that 10% when the local government was struggling to recover from the storm itself (Singer, 2006). Roberts (2006) also pointed out that smaller, poorer states in general have more difficulty in dealing with their portion of the responsibility of responding to natural disasters, particularly those with the magnitude of the 2005 hurricanes. These larger events can completely overwhelm them.

1.3.2 Affects on the Population

The residents of affected areas were obviously negatively affected by the failures of FEMA as well. Besides experiencing delays in accruing recovery funds, some people displaced by the storms were faced with prolonged stays in inadequate temporary housing, some of which proved to be a health threat due to formaldehyde exposure. Another possible health concern for these victims was the lack of health care and mental health care services available to them (Redlener, 2008). The poor management of the FEMA funds caused vulnerable populations especially to be unable to adequately recover and get back on their feet.

This is somewhat surprising considering the huge amount of money appropriated for disaster prevention and management following the attacks of September 11, 2001. However, it has been proposed that the focus on terrorism following the terrorist attacks led to institutional and administrative changes that may have influenced FEMA's capability to respond to natural disasters.

In addition to the problems associated with the management of the hurricane events and the resulting recovery funds, there were also certain conditions that existed in areas of the Gulf Coast that exacerbated the already complex and severe situation following the hurricane season of 2005. New Orleans, for example, is a large city that sits below sea level, making it susceptible to flooding (Cutter et al., 2006). Another factor that affected the severity of Katrina in New Orleans was the so-called "levee effect" in which the presence of levees causes more development in low-lying, flood-prone areas which are subsequently severely damaged when an event such as Katrina eventually occurs (Kates et al., 2006). Along with poor development locations, New Orleans, and other surrounding coastal areas, are at an ever-increasing risk of storm damages due to the degradation of the wetlands, which would normally serve as natural buffers (Bullard et al., 2009). Hooks et al. (2006) states that FEMA assistance proved to be particularly ineffective at helping those who were most affected and in need of assistance, financial or otherwise. One example of this would be the fact that a higher percentage of low-income families lack insurance and certain federal assistance programs require insurance as a prerequisite for eligibility of the aid. Moreover, vulnerable populations saw a lagging recovery when compared to more affluent neighborhoods. In Biloxi,

Mississippi, for example, the wealthier parts of the city, such as along the coastline where the casinos are located, had received insurance settlements and begun rebuilding before the poorer neighborhoods had even gotten the storm debris cleared (Cutter et al., 2006).

CHAPTER 2: LITERATURE REVIEW AND BACKGROUND INFORMATION

2.1 FEMA Disaster Management

In order to understand how the recovery fund distribution following the 2005 hurricane season resulted, it is important to also understand the history and process of FEMA disaster management. After a natural disaster event occurs, the governor of the affected state must formally request federal assistance from the President of the United States if they feel that the resources of the State alone will not be sufficient for handling the recovery. After the governor has submitted this request, FEMA officials meet with the State officials and create a Preliminary Disaster Report (PDR), which they then use to make a recommendation to the President regarding the state's eligibility (CRS, 2012). Once this has occurred, the President then must decide on the eligibility of the event for federal assistance. If it is determined to be eligible, the President declares the state a disaster area. Now that this declaration has been made, the state may receive federal assistance from FEMA. Normally these funds come from the Disaster Relief Fund (DRF) that receives money from Congress every year as part of the fiscal budget. In severe events that require large amounts of money, the amount of aid given out is determined by Congressional appropriations, as was the case for Hurricane Katrina (Garrett and Sobel, 2003). As defined by FEMA, a major disaster is"…any natural catastrophe (including and hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought), or, regardless of cause, any fire, flood, or explosion, in any part of the United States, which in the determination of the President causes damage of

sufficient severity and magnitude to warrant major disaster assistance under this chapter to supplement the efforts and available resources of states, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby." The types of recipients eligible under this declaration are state and local governments, certain designated non-profit organizations, and families or individuals. It may be used to repair or replace infrastructure, provide temporary housing, unemployment assistance, crisis counseling, and for other programs (CRS, 2012).

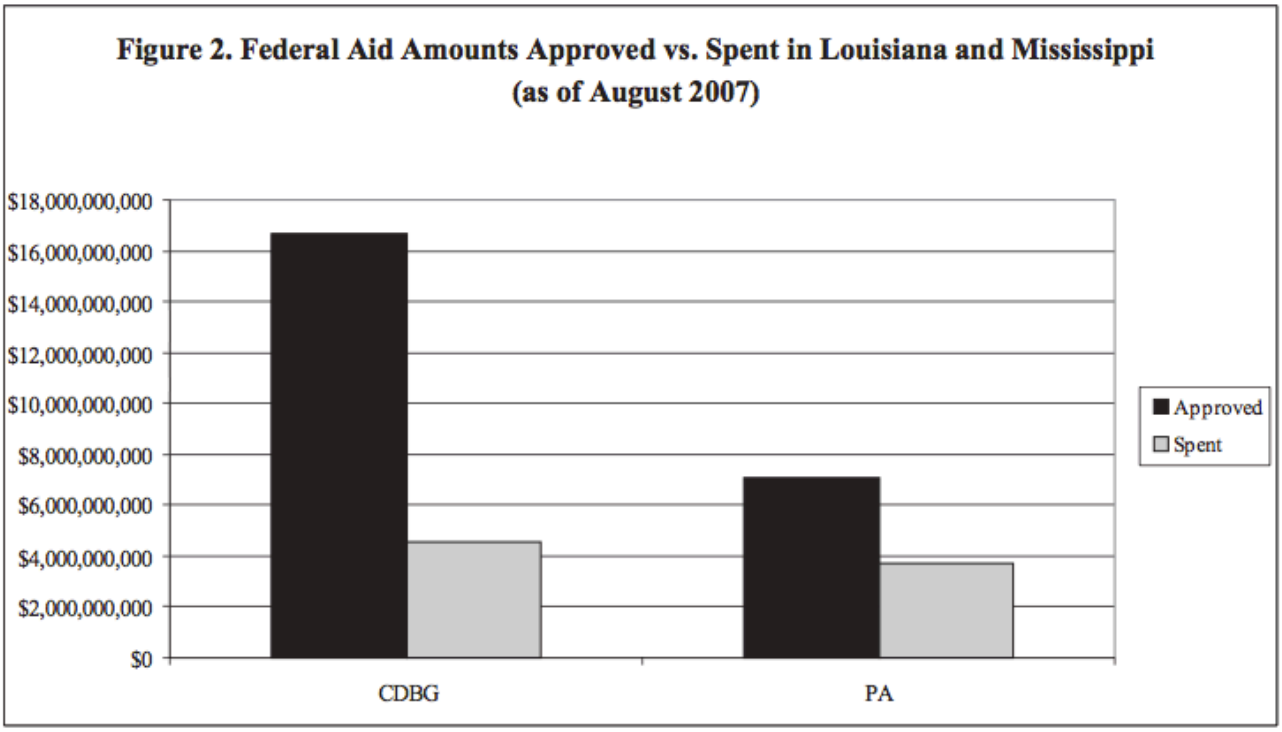
2.1.1 Public Assistance Program

The Public Assistance program is the largest single source of disaster funds available to disaster victims, followed by the Community Development Block Grant program which is carried out by HUD. To determine eligibility for Public Assistance funds, FEMA considers the severity of the storm and its impacts in terms of per capita impacts, insurance coverage, hazard mitigation measures, prior year disaster impacts, and whether or not the Stafford Act is the best statute for the situation, or if another would better serve the interests of the affected areas. If it determined that an area has enough resources at their disposal to affectively manage the recovery without federal aid, they will be denied disaster assistance in that case (CRS, 2011).

In order to receive money, an applicant must submit a Request for Public Assistance. This form simply identifies the applicant, general claim information, and opens the Case Management File that is used for managing the particular project. If an applicant is approved, the funds will be made available by FEMA to the grantee (the State) for use by the sub-grantee (local government or organization). It should

also be noted that the state officials are the ones responsible for making decisions regarding how much money is sent to each location (Pike, 2007).

As can be imagined, this process can take a very long time as the decisions regarding funding are passed down step by step. The lag time in recovery expenditure by FEMA has been one of the loudest complaints following the 2005 hurricane season. For example, Figure 2.1 shows the approved amount of money for both the PA program and the CDGB program within Mississippi and Louisiana compared to the amount that had actually been spent as of August 2007.



Source: Pike, 2007.

Figure 2.1 PA and CDBG Funds Approved and Spent as of August 2007

As of two years after the hurricanes occurred, only about $4 Billion of the approved $7 Billion in PA funding had been spent. Additionally, when states are worried about having enough money to cover their rebuilding projects, they can set aside a portion of their CDBG funding to insure they will have enough money. This takes away from the money that could otherwise be available to help individuals with their housing needs (Pike, 2007). This clearly points out the need for changes to the disaster aid funding process within FEMA.

2.1.2 History of FEMA Disaster Management

Following the hurricanes of the 2005 season, some held the opinion that the overall management of the response by FEMA was inadequate. Although FEMA's budget was larger than it had ever been, changes that had been made to the agency following the September 11, 2001 terrorist attacks are thought to have hindered its ability to respond to natural disasters, particularly very large ones such as Katrina. These changes included the creation of the Department of Homeland Security, the Homeland Security Act of 2002, and certain management frameworks for disaster events (Tierney, 2012). Historically, FEMA does not handle so many complex responsibilities very well. Prior to the reorganization of FEMA following Hurricane Andrew in the 1990s, FEMA had a similar problem. The agency suffered because it was responsible for terrorist attacks as well as the more common fires, hurricanes, tornadoes and other storms, and man-made disasters such as chemical and oil spills. FEMA lacks the resources to adequately handle too many areas of disaster preparation and does better if focused only on natural disasters (Roberts, 2006).

2.1.3 Post-2005 Changes

There have been a few amendments to FEMA and the Stafford Act in the years since 2005, no doubt due to the large amount of criticism the agency received. The 109th Congress, which took office in 2006, conducted an investigation of the response to Hurricane Katrina in order to gain insight into what caused the mismanagement and what improvements could be made for the future. Basically these amendments made the following changes: accelerated federal aid, provided provisions for helping those with special needs, expanded the disaster assistance to include transportation, expanded the federal housing assistance available to victims, allowed Public Assistance funding to pay for the rebuilding of facilities regardless of soil conditions (previously, it was only allowed for facilities in unstable soil), and required the President to designate a Small State and Rural advocate within FEMA. These changes were all made in an effort to address the issues that occurred during the response to the 2005 storms (CRS, 2011).

2.2 Politics and Disasters

There has been some research on how politics can influence the recovery process following a disaster. In Louisiana, the political culture of the state has been blamed for the lagging recovery from the 2005 hurricanes. Also, ethical issues faced within the State administration combined with the reputation of the state hindered the ability of the State to successfully attain recovery dollars, re-develop damaged areas, and gain investments. It has been shown in related research that the political corruption resulting from misuse of disaster recovery dollars can lead to long-term affects for the location where economic growth and investment is hindered (Boettke

et al., 2007). When comparing Mississippi to Louisiana, one might expect similar recovery results due to the fact that they were similarly affected by the storms. However, due to political differences between the two states, Mississippi fared much better than Louisiana in terms of Katrina recovery overall (Jurkiewicz, 2009). The governor of Mississippi at the time, Haley Barbour, used his political ties to acquire more recovery funds for his state both from Washington and his fellow Republican governor, Jeb Bush, of Florida (Waugh Jr., 2009).

Garrett and Sobel (2003) conducted a study of FEMA payments following disaster events. Their objective was to determine if there are political influences on FEMA and on Presidential disaster declarations. They found that there are political influences on Presidential disaster declarations, particularly during an election year. They also found that the Congressional oversight committee in charge of the Stafford Act influences FEMA payments by sending money to their constituents more often than to areas they do not represent. Overall, the authors concluded that over half of all payments made by FEMA are done so for political reasons. This study, however, was conducted prior to the reorganization of FEMA that took place in 2003 wherein FEMA became a part of DHS. A later study by one of the same authors (Sobel et al., 2007) re-examined the issue of the congressional influences on FEMA and found that post-reorganization, but before Hurricane Katrina, there seemed to no longer be a correlation between congressional oversight and FEMA aid payments. The authors stipulate that this is due to FEMA's inclusion in DHS, which is a very large agency with a very large budget. Since FEMA is no longer a freestanding agency, there is less opportunity for direct influences by Congress due

to the increased bureaucracy. Also, FEMA's budget is roughly about 10% of that of the DHS and it is possible that there are now other, easier ways to target geographic locations with political favors in the form of DHS expenditures. No substantive study has yet been conducted to examine the presence or absence of political influences on FEMA by Congressional Oversight Committees post-2005. However, Sobel et al. (2007) reported that they performed a brief study using data taken from after Hurricane Katrina and still found no significant correlation between Congress members and FEMA aid payments. This is also attributed to the current structure of FEMA following the reorganization in 2003.

There is evidence of the correlation between disaster recovery funds and political corruption. According to some, there is a clearly positive relationship between the amount of recovery funds a government is awarded and the political corruption of that government. FEMA funds are particularly corruptive because of the hectic environment in which they are generally distributed. Oversight of the fund distribution and use can be a daunting task in such conditions and can easily be overlooked (Boettke et al., 2007).

2.3 Disasters and Vulnerability

A term that is often agreed upon as the opposite of resilience is vulnerability. In terms of natural disaster events, a community's vulnerability to the effects of the disaster is a combination of the event itself and the social and historical context in which it occurs (Masozera et al., 2007). Within the social science community, it is generally agreed upon that major factors influencing social vulnerability include lack of resources, information, and technology, social capital, beliefs and customs,

age, and infrastructure (Cutter, 2003). Vulnerability to hazards is the amount of exposure a population faces to a certain hazard coupled with that population's ability or inability to prepare for and respond to the hazardous event (Gulieria, 2011). Vulnerability, when combined with low adaptive capacity, can be associated with a community's access to resources, technology, and wealth, their risk perceptions, social capital, and the structure of their community, along with the organization of the local institutions responsible for warning of and planning for natural hazards. Another common cause of increased vulnerability within a community is the existence of certain institutional policies that are in place that may be discriminating against certain groups of people, although not necessarily with those intentions. Some policies, when enacted, can appear to be very fair to all people but, in actuality, disadvantage some groups with historically fewer resources at their disposal (Henkel et al., 2006). Additionally, socially vulnerable populations tend to reside in more environmentally hazardous locations, have less insurance, and are less likely to implement actions that could generally better prepare them for a disaster event (Masozera et al., 2007). A stark example of how social vulnerability can directly impact how a natural disaster affects a community is New Orleans. Because Hurricane Katrina struck on August 29, right before welfare and disability checks were due, many people could not afford to evacuate and therefore were left in the path of the storm to fend for themselves (Cutter et al., 2006).

Populations with more wealth, or otherwise greater access to resources, can better afford to take precautionary actions that will better prepare them for a natural disaster (Redlener, 2008). However, this is not only relevant to the United

States. Globally, disparities in income, political power, and gender equality create a situation that is difficult to manage when disasters occur (Tierney, 2012).

Coastal risks can be exacerbated by a community's inability to plan or lack of planning for disaster events. This is particularly true for an event as unique as the hurricane season of 2005, specifically Hurricane Katrina. Besides the sheer magnitude of the storm, there was also an failure of governmental institutions set up to handle situations such as that (Boettke et al., 2007). The storm itself is not only difficult to manage, but when there is an event of such great magnitude, the recovery process becomes complicated in terms of who is responsible for ensuring adequate recovery and financing that recovery.

2.4 Resilience

Resilience in the face of disasters is becoming ever more important as global climate change and population growth cause natural hazards to not only occur more frequently but also affect many more people. In the literature, resilience is sometimes viewed as a three-legged barstool. The first leg represents the economic and financial institutions in place. The second leg represents the political and legal institutions in place. The third and final leg represents the social and cultural institutions in place. If all three legs are not strong, the stool will fall apart whenever any weight, or disturbance, is put upon it (Boettke et al., 2007). All over the world, coastal communities are at an increasing risk of facing coastal hazards, which threaten the overall health and sustainability of the natural and human environments. This is in part due to the large amount of the population living near the coasts. Worldwide, it is estimated that 23% of the population lives in areas

classified as coastal areas (Gulieria et al. 2011). However, it is not only the physical location of a population that affects its resilience. When environmental exposure, such as damage from a hurricane, is met with high social vulnerability, the ability of the population to rebound from the disturbance is hindered and the resilience is low (Cutter et al., 2006).

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Choosing Variables

The independent variables for this study can be organized into three categories, each representing a population's ability to respond to disasters. These categories are capacity to adapt, vulnerability of the population, and environmental exposure to the disaster.

3.1.1 Vulnerability Variables

From the literature, it has been gathered that social vulnerability is related to a decreased ability to respond to and recover from disasters. It has been seen in the literature that aspects of personal income have an effect on a person's social vulnerability. In particular, having low personal income has a positive correlation to social vulnerability (Masozera et al., 2007; Cutter et al., 2007). In addition, persons with low income are less likely to own a vehicle and are therefore dependent on others to evacuate them. For this reason they may be more likely to be personally affected by a disaster (Redlener, 2008). For this study, the percentage of families living in poverty (*pctpov*) is included to represent this aspect of vulnerability within a community.

Members of the population who are in the extremes of age tend to have more difficulty in dealing with disasters in terms of actually moving out of harm's way. They may rely on the assistance of others to evacuate and care for themselves, and their social vulnerability is therefore increased. In some cases, those who care for them also tend to have higher social vulnerability because of the resources they have spent on caring for those in the age extremities (Masozera et al., 2007; Cutter

et al., 2003). This aspect of vulnerability is represented here as the median age in each county (*age).*

A final community characteristic that influences vulnerability to disasters is the nature of the residential property within the county. For example, mobile homes are particularly prone to damage from an event such as hurricane (Cutter et al., 2007). The percentage of mobile homes in each county (*pctmobile)* is therefore included in this study.

3.1.2 Capacity to Adapt Variables

Within the category of Capacity to Adapt are variables that are thought to affect a community's resilience and social capital. Social capital is defined for the purpose of this study as "…a set of adaptive capacities that can support the process of community resilience to maintain and sustain community health" (Sherrieb et al., 2010).

The ability of a county government to plan for and mitigate disaster effects, and adapt to them if need be, is related to how well the community members will recover. In order to represent the overall economic and professional conditions within each county, a dummy variable was used to indicate whether or not each county was located within a Metropolitan Statistical Area (*msa).* An MSA is an area defined by an urban core of 50,000 or more people and includes the surrounding counties, which are determined to be socially and economically tied to the urban core (www.census.gov). However, because binary variables are invalid in a linear regression model, the MSA variable will be excluded and will instead only be used in

a difference of means test to compare the PA funds between those counties within and not within an MSA.

In order to try and capture any political influences coming from members of congress in each state, I included a variable with the number of congress members each state had on a FEMA oversight committee in the 109th Congress (*congress)*. This method was adapted from the related research by Garret and Sobel (2003) regarding political influences on federal disaster relief. The FEMA Oversight Committees are the House Appropriations Subcommittee on Homeland Security, the House Select Committee on Homeland Security, the Senate Appropriation Subcommittee on Homeland Security, and the Senate Committee on Homeland Security and Government Affairs.

A third aspect of a community's capacity to adapt included in this study is the density of the population, in term of population per square mile (*popsqmile)*. It has been seen in relevant research that rural populations can have less access to information and resources that would allow them to be better prepared in handling a large natural disaster event (Cutter et al., 2003).

3.1.3 Exposure Variables

According to Cutter et al. (2006), exposure is "…the result of physical location and the character of the environment in a particular place." For the purposes of this study, exposure is taken as the affects of the 2005 hurricane season that resulted from the physical location and character of the environment. This is represented here as the percentage of severely damaged housing units within each county (*pctsvrdam)*. This data was collected by FEMA field agents by way of direct

observations while they were determining aid eligibility. The data was gathered in the time between the storm event and February 12, 2006. In order to be classified as "Severe Damage" the housing unit had to have experienced at least $5,200 of damage, or, in the case of Orleans, St. Bernard, and Jefferson Parishes, had to have had flooding of at least one foot of water (HUD, 2006).

Table 3.1 Variables Used in this Study

VARIABLE NAME	**DESCRIPTION**
Dependent Variable: PERCAPFEMA	Per capita amount (in dollars) of FEMA Public Assistance funds, 2005-2006 *(www.Data.gov)*
Independent Variables: (Capacity to Adapt) POPSQMILE	Population per square mile, 2000 *(U. S. Census Bureau)*
CONGRESS	Number of Congress members on a FEMA Oversight Committee, 109th Congress *(U. S. Government Printing Office)*
MSA	Dummy variable, whether or not the county is located in a Metropolitan Statistical Area, 2005 *(U. S. Census Bureau)*
(Vulnerability) PCTPOV	% families living in poverty, 2000 *(U. S. Census Bureau)*
AGE	Resident median age, 2000 *(U. S. Census Bureau)*
PCTMOBILE	% occupied housing units that are mobile homes, 2000 *(U. S. Census Bureau)*
(Exposure) PCTSVRDAM	% occupied housing units with severe damage, 2006 *(U.S. Dept. of Housing and Urban Development)*

3.2 Data Analysis

First, the data were analyzed in Excel to determine the descriptive statistics for the average, standard deviation, minimum, and maximum in each state and in the sample as a whole. Then, in order to understand the relationships that exist between the variables, a bivariate correlation analysis was conducted using SPSS 21. Once it was determined that the relationships among the variables was appropriate, a linear regression analysis was performed to try and explain the distribution of the FEMA Public Assistance grant funds. Multiple regression is often used to try and predict one variable from another and show the strength of the causal relationship. There has not been a great deal of research looking at the distribution of FEMA funds. However, within the social sciences, when one wishes to examine a relationship and make predictions about how one variable affects another, multiple regression is very useful (Field, 2009).

CHAPTER 4: SURVEY METHODS

4.1 Survey Instrument

A brief survey was sent out via email to one county official in each of the 136 counties in the study area during the fall of 2012 (See Appendix A for Survey Materials). These officials were the Disaster Management Coordinator, County Manager, or equivalent. Email addresses for the participants were acquired from county websites in most cases, although a few were obtained from state Emergency Management Agency websites. In order to receive the most accurate responses possible, the email received by each county official asked them to forward the email to the person most knowledgeable of the recovery process following the 2005 hurricane season, if they felt like they were not that person.

The survey consisted of 6 questions. The first simply asked the participant to identify their county and state. The second and third question asked the respondents to rank the level of priority given to recovery activities such as infrastructure and housing immediately following the hurricane(s) and in the long-term. The next question asked the respondents which activities were completed more successfully, immediate, long-term, or both. The fifth question listed some problems commonly experienced by communities following the hurricanes in dealing with FEMA and asked them to signify which problems, if any, were experienced in their county. The sixth and final question simply asked them to provide any additional comments that they had.

4.2 Survey Recipients

Following the initial email, the survey received 16 responses out of 136. A reminder email was sent out two weeks following the initial request. This generated eight more responses, with a total now of 24. Two weeks following the reminder, a final reminder was sent and generated 9 more responses. The total number of surveys completed was 33 out of 136. After approximately two months, the survey was closed with a response rate of 24%.

4.3 Analyzing the Survey

First, the data gathered from the survey was downloaded from surveymonkey.com and put into an Excel spreadsheet so that it could be easily analyzed and managed. The data were then analyzed visually using graphs to clarify the data and make it more meaningful. No further analysis was conducted using the data from the survey due to the malfunction of the survey instrument which did not allow accurate responses on one of the questions. If analysis were performed it would not be valid or meaningful for this study.

In order to determine whether there was a response bias, or some characteristic of those that responded that meaningfully differs from those who did not respond, a difference of means test was performed using the independent t test in SPSS 21.

CHAPTER 5: RESULTS

5.1 Descriptive Statistics

The highest amount of Public Assistance funding went to East Feliciana parish in Louisiana ($73,182.24 per capita). Louisiana also had the highest average of PA funding ($4,262.78). This makes sense since Louisiana had the highest average damage (31% of housing units) and St. Bernard Parish, Louisiana had the highest of any other county (76%). The lowest amount of PA funding occurred in Wilcox County, Alabama ($1.32 per capita). Alabama had the lowest average of any state as well ($33.20 per capita). However, the lowest amount of damage was instead in Highlands County, Florida (0.06%) and the lowest average of any state (8%) was also in Florida. It is interesting that although Alabama had the lowest average per capita PA funds, Florida had the lowest average percentage of damaged housing units due to the hurricanes.

Now I will discuss the variables representing socioeconomic characteristics of the study area, beginning with those that deal with the capacity to adapt to disasters. The highest average population density (residents per square mile) was found in Florida. However, the maximum density in a single county was Orleans Parish, Louisiana, with a population density of 2,678 persons per square mile. This is due to the large population of the city of New Orleans. The smallest average population density average was found in Alabama, but the smallest minimum within a single county was Cameron Parish, Louisiana with a population density of 7.6 persons per square mile. The *congress* and *msa* variables are excluded from the

descriptive statistics analysis because they do not differ county to county. Also, *msa* is a categorical dummy variable.

Now, the variables characterizing vulnerability within the study area will be covered, beginning with *pctpov*. Florida had one of the highest average number of families in poverty overall (27%), as did Alabama. However, the county with the highest percentage of impoverished families was Sabine County, Texas. The lowest average percentage of families in poverty was in Louisiana (26%) and the lowest overall percentage was in West Feliciana Parish, Louisiana (18%).

The highest percentage of mobile homes was found in Alabama overall, but the highest single county was located in Florida. Obviously, Alabama has more mobile homes generally spread throughout the state and Florida has areas with a lot of mobile homes but some areas with very few. The fewest mobile homes are found within Louisiana, which may be surprising considering the large amount of rural areas within the state. However, one must consider the proximity to water and flooding events that takes place regularly within the state that would deter residents from living in mobile homes.

The average age of the population within the full study area is 35.5. However, the counties in Florida have the oldest overall population and those in Mississippi have the youngest. This is logical due to the popularity of Florida for retirees.

Table 5.1 Descriptive Statistics

VARIABLE	MEAN	STDDEV	MIN	MAX
PA Funds Per Capita				
Full Sample (n=136)	1476.44	7220.69	1.32	73182.24
Florida (n=14)	182.08	225.52	5.51	881.38
Louisiana (n=38)	4262.78	11369.17	5.51	73182.24
Mississippi (n=49)	662.71	2030.88	6.88	12737.00
Alabama (n=12)	33.20	54.46	1.32	198.85
Texas (n=23)	147.37	326.16	1.84	1541.92
Percent Severely Damaged Housing Units				
Full Sample (n=136)	5.07	13.29	0	78.4
Florida (n=14)	1.74	3.12	0	11.3
Louisiana (n=38)	10.16	20.35	0	78.4
Mississippi (n=49)	4.52	11.74	0.1	69.8
Alabama (n=12)	0.46	0.60	0	2.1
Texas (n=23)	2.27	2.95	0	8.5
Population Per Square Mile				
Full Sample (n=136)	165.64	353.23	7.60	2677.64
Florida (n=14)	375.98	418.05	13.70	1346.90
Louisiana (n=38)	231.37	494.58	7.60	2677.80
Mississippi (n=49)	63.70	64.64	13.60	326.30
Alabama (n=12)	59.47	90.25	14.80	324.30
Texas (n=23)	201.56	414.16	16.20	1966.80
Age				
Full Sample (n=136)	35.45	3.80	24.80	50.00
Florida (n=14)	41.51	5.37	29.50	50.00
Louisiana (n=38)	34.24	1.79	28.30	38.20
Mississippi (n=49)	34.16	2.69	24.80	38.50
Alabama (n=12)	35.26	2.14	31.90	39.00
Texas (n=23)	36.62	4.10	29.70	47.00
Percent Families in Poverty				
Full Sample (n=136)	26.62	1.84	18.02	30.31
Florida (n=14)	27.11	2.02	22.92	29.78
Louisiana (n=38)	26.19	1.77	18.02	28.30
Mississippi (n=49)	26.59	1.65	21.55	28.67
Alabama (n=12)	27.22	1.27	24.85	28.87
Texas (n=23)	26.80	2.37	18.67	30.31

Table 5.1 Continued

VARIABLE	MEAN	STDDEV	MIN	MAX
Percent Mobile Homes				
Full Sample (n=136)	9.60	5.17	0.15	30.07
Florida (n=14)	9.56	8.39	0.68	30.07
Louisiana (n=38)	8.30	4.62	0.15	24.72
Mississippi (n=49)	9.21	3.21	1.58	17.22
Alabama (n=12)	12.91	4.46	3.85	18.63
Texas (n=23)	10.83	6.59	1.15	28.81

**msa and congress variables excluded*

5.2 Correlation Analysis

In order to analyze the correlations between the dependent variable (*pctsvrdam)* and the independent variables, and also between the independent variables themselves, a bivariate correlation analysis was performed using SPSS Version 21. The results of this analysis can be seen in Table 5.2. Damage has the highest correlation with PA funds with a Pearson's *r* value of .422, which is significant at the 0.01 level. This means that as the amount of severe damage increases, so does the amount of PA expenditure within the county.

The only other variable with a significant correlation is the MSA dummy variable indicating whether or not the county is located within a MSA. This has a positive correlation with a Pearson's r value of .194, which is significant at the 0.05 level. This means that the counties that are a part of an MSA are receiving more funds. Although this correlation is significant, it is not as significant as the correlation between damage and PA funds. No other independent variable had a significant correlation with PA funds. It is also important to point out that, as per the most recent research regarding political influences on FEMA disaster expenditures, *congress* does not have a significant correlation with PA funds in this study.

As a diagnostic step in the analysis process, the correlations between the independent variables themselves was analyzed to make sure none of the variables were essentially measuring the same thing (Appendix C). This was done in an effort to prevent multicollinearity within the regression analysis to follow. It was determined that no variables had a correlation coefficient higher than 0.800. The highest correlation was between *pctpov* and *age* with an r value of .581, which is significant at the 0.01 level. According to Field (2009), this is acceptable to include in the regression analysis.

Table 5.2 Correlations Between PA Funds and Independent Variables

VARIABLE	**CORRELATION COEFFICIENT (***Pearson's r)*
PCTSVRDAM	.422**
PCTPOV	-.118
PCTMOBILE	-.006
AGE	.001
CONGRESS	-.165
POPSQMILE	.003

**Correlation is significant at the 0.05 level.*
***Correlation is significant at the 0.01 level.*

5.3 Regression Analysis

In order to examine the causal relationships between FEMA PA funds and the 7 independent variables, a multiple regression analysis was performed using SPSS 21. The variables were entered into the model using the forced entry method (*Enter* in SPSS), which forces all independent variables, or predictors, into the model in unison.

A summary of the model can be seen in Table 5.3. The adjusted R square is .190, which means that this regression model was able to explain about 19% of the variance in FEMA PA funds. It is important to point out that this model represents the best model that could be obtained from various variables, meaning that several other model were tried in an attempt to achieve a higher R squared value, but that was not able to be done.

Table 5.3 Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.475[a]	.226	.190	6500.60001

a. Predictors: (Constant), pctmobile, pctsvrdam, congress, pctpov, popsqmile, age

Below, in Table 5.4, are the results of the ANOVA analysis. According to these results, the regression model is a good fit to the data overall, with an F value of 6.261. This value of F is highly significant with a $p < .001$.

Table 5.4 Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.587E+9	6	264571613	6.261	.000[b]
	Residual	5.451E+9	129	42257800.5		
	Total	7.039E+9	135			

a. Dependent Variable: percapfema

b. Predictors: (Constant), pctmobile, pctsvrdam, congress, pctpov, popsqmile, age

The coefficients for each predictor in the model is shown in Table 5.5. Damage (*pctsvrdam)* is the most significant predictor, with a Beta value of .429. The only other significant variable is poverty (*pctpov),* which has a Beta value of -.226. I would also like to point out that, once again, there does not appear to be Congressional influences on the

FEMA PA fund distribution. The *congress* variable is not showing significance in the regression analysis. As mentioned previously, a difference of means test was performed to determine if there is a significant difference between the amount of funding received by counties who were in an MSA in 2005 and those who were not. The difference in funding amount between the two groups is significant, at p= .044. This indicates that counties who are economically and socially tied to urban centers received significantly more funding than those not tied to an urban center.

Table 5.5 Regression Model Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14555.739	8319.636		1.750	.083
	pctsvrdam	232.787	43.941	.429	5.298	.000
	pctpov	-887.143	383.139	-.226	-2.315	.022
	popsqmile	-2.097	1.891	-.103	-1.109	.269
	congress	-597.403	451.508	-.111	-1.323	.188
	age	305.658	193.216	.161	1.582	.116
	pctmobile	27.513	130.087	.020	.211	.833

a. Dependent Variable: percapfema

The strong positive relationship between damage experienced as a result of the 2005 hurricanes and the amount of FEMA Public Assistance funding received by a county is a very good sign about the management of the recovery by FEMA. One would expect that locations where more damage is done will require more money to rebuild, and it appears that this is indeed what happened. The other significant predictor of PA funding was poverty, with a negative relationship. This indicates that the incidence of poverty within a county appears to encumber the amount of federal disaster aid dollars they are getting. This is a disheartening result because, in the face of a large natural disaster, those who are

already financially marginalized are going to need more assistance than those who are wealthier. The impoverished have lower rates of insurance ownership and lack financial safety nets and can therefore not be expected to be able to afford to rebuild their lives after such a disturbance. It appears that FEMA did not take these types of community characteristics into consideration when making decisions about how to provide financial aid to disaster survivors.

The fact that the other explanatory variables did not significantly affect the dispersal of PA funds, and that poverty and damage are accounting for just 21%, leaves a lot left unexplained about what is ultimately the driving force affecting who is able to secure federal disaster dollars.

CHAPTER 6: SURVEY RESULTS

6.1 Survey Response Analysis

As previously mentioned, the overall response rate of the survey was 24%. Figure 6.1 shows the counties that responded to the survey with those that did not respond or chose to not be identified. Texas had the highest response rate with 7 responses out of the 23 counties included in this study, or 30% response. Louisiana parishes had a 26% response rate. Florida counties had a 21% response rate. Mississippi counties had an 18% response rate. Finally, Alabama had the lowest response rate of 17%. Two respondents chose to not specify their county and state.

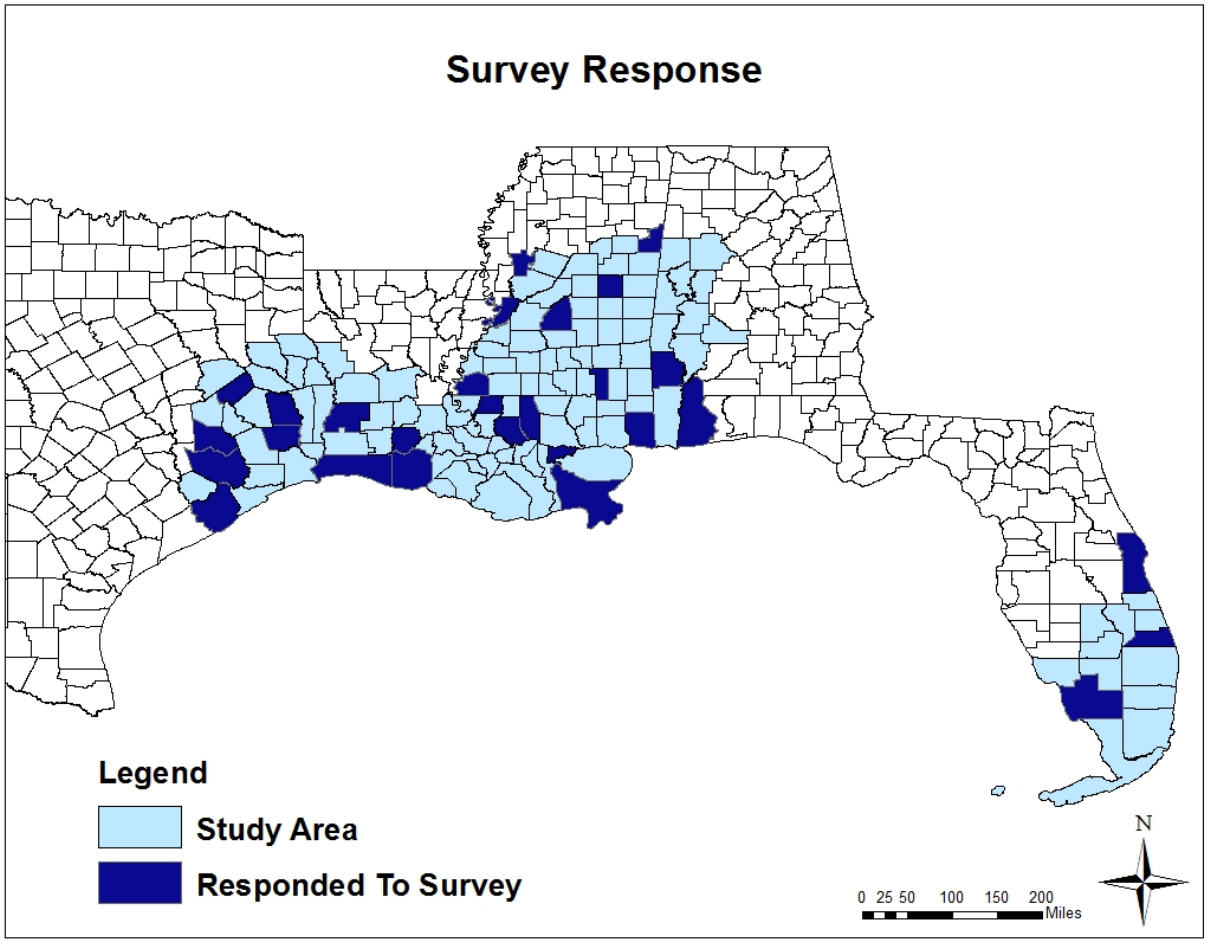


Figure 6.1 Map Showing Survey Response

In order to determine if there was any bias in the survey response, or certain characteristics about those who responded that differs significantly from those who did not, a difference of means test was performed using the independent t test. The variables compared between groups were level of education, population density, and per capita income, all gathered from the 2000 Census. Table 6.1 below shows the mean and standard deviation of the variables in the two groups. Group 1 includes the counties who responded and group 2 includes those who did not respond.

Table 6.1 Group Statistics of Response Bias Analysis

Group Statistics

	response	N	Mean	Std. Deviation	Std. Error Mean
pcthighed	1.00	28	10.7804	4.75237	.89811
	2.00	108	8.9719	4.15746	.40005
popsqmile	1.00	28	265.1964	597.29525	112.87819
	2.00	108	139.8250	253.23495	24.36754
percapincome	1.00	28	17641.5357	4769.46815	901.34476
	2.00	108	15613.7130	3544.43154	341.06308

On average, the group 1 members are more educated, make more money on a per capita basis, and live in more densely populated areas. The average percentage of people with more than a high school diploma in group 1 is 10.8%, while the average of those in group 2 is about 9%. The average population density in group 1 is about 265 people per square mile, while in group 2 it is about 140 people per square mile. Finally, the average per capita income in group 1 is about $17,642, and in group 2 it is about $15,614. However, in order to determine if these differences are statistically significant, the independent samples t test results must be analyzed (Table 6.2).

Table 6.2 Independent T Test Results

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
pcthighed	Equal variances assumed	3.435	.066	1.991	134	.049	1.80849	.90850	.01163	3.60535
	Equal variances not assumed			1.839	38.396	.074	1.80849	.98318	-.18119	3.79817
popsqmile	Equal variances assumed	6.941	.009	1.685	134	.094	125.37143	74.40335	-21.78543	272.52829
	Equal variances not assumed			1.086	29.559	.286	125.37143	115.47841	-110.61460	361.35746
percapincome	Equal variances assumed	2.880	.092	2.501	134	.014	2027.82275	810.73773	424.32479	3631.32072
	Equal variances not assumed			2.104	35.104	.043	2027.82275	963.71490	71.58417	3984.06134

Because the significance of the Equality of Variances test for higher education (*pcthighed)* is above 0.05, the values for "equal variances assumed" were analyzed. The results of the t test for higher education are significant, with a p value of .049. This means that the group of those who responded to the survey (group 1) are significantly more educated than the members of group 2, who did not respond to the survey.

For population density, the p value for the Equality of Variance test is below 0.05, equal variance is not assumed and the values for that category are thus analyzed. The t test for differences in population density of the two groups (p = .286) is not significant. This means that there are not significant differences in population density between those who responded to the survey and those who did not.

The third and final variable I tested for differences of means is per capita income. Equal variance in this data is assumed (p= .092), and the t test results are significant (p= .014). This means there is a significant difference in the amount of income earned on a per

capita basis between the two groups. To summarize, the responders to the survey are significantly more educated and make more money. Although their average population density is higher than that of the non-responders, the difference is not statistically significant.

6.2 Survey Data Analysis

The first two questions ask the participants about how they rate recovery activities during different phases of recovery. The recovery activities were adapted from the *National Disaster Recovery Framework* (FEMA, 2011). For the first question, the participants were asked to rate, from 1 to 5, the level of priority that was placed on certain immediate recovery activities within their county (see Figure 4.1). Unfortunately, the survey software did not function properly on this question by not allowing the participants to rate more than one activity as the same priority level. Therefore, the results may not be reflective of the true priorities given in the immediate aftermath of the storms. However, the participants had the option to not answer the question, and this was done by three of the 33 respondents. The highest rated immediate recovery activity were those in the Debris/Infrastructure category, with an average rating of 4.52 out of a possible 5. This includes the removal of debris and the immediate repair of infrastructure. The Business category, which includes the re-establishment of local business operations, received an average rating of 3.35/5. Housing, in particular providing temporary housing solutions, received an average rating of 3.3/5. Public Health and Health Care, defined as providing continuity of care through temporary facilities, received an average rating of 3/5. The Mitigation Activities Category, which includes informing community members of opportunities to build back stronger, received an average priority level rating of 2.5/3.

Finally, the lowest average priority level rating given during the immediate response phase following the storms was the Emotional/Psychological category. This was defined to be support networks provided by the county governments. The average rating given to this was a 2.2 out of 5. I would also like to point out that the average ratings for this question are fairly heterogeneous. While a couple categories were given high ratings on average, some (particularly Emotional/Psychological and Mitigation Activities) were given fairly low average ratings.

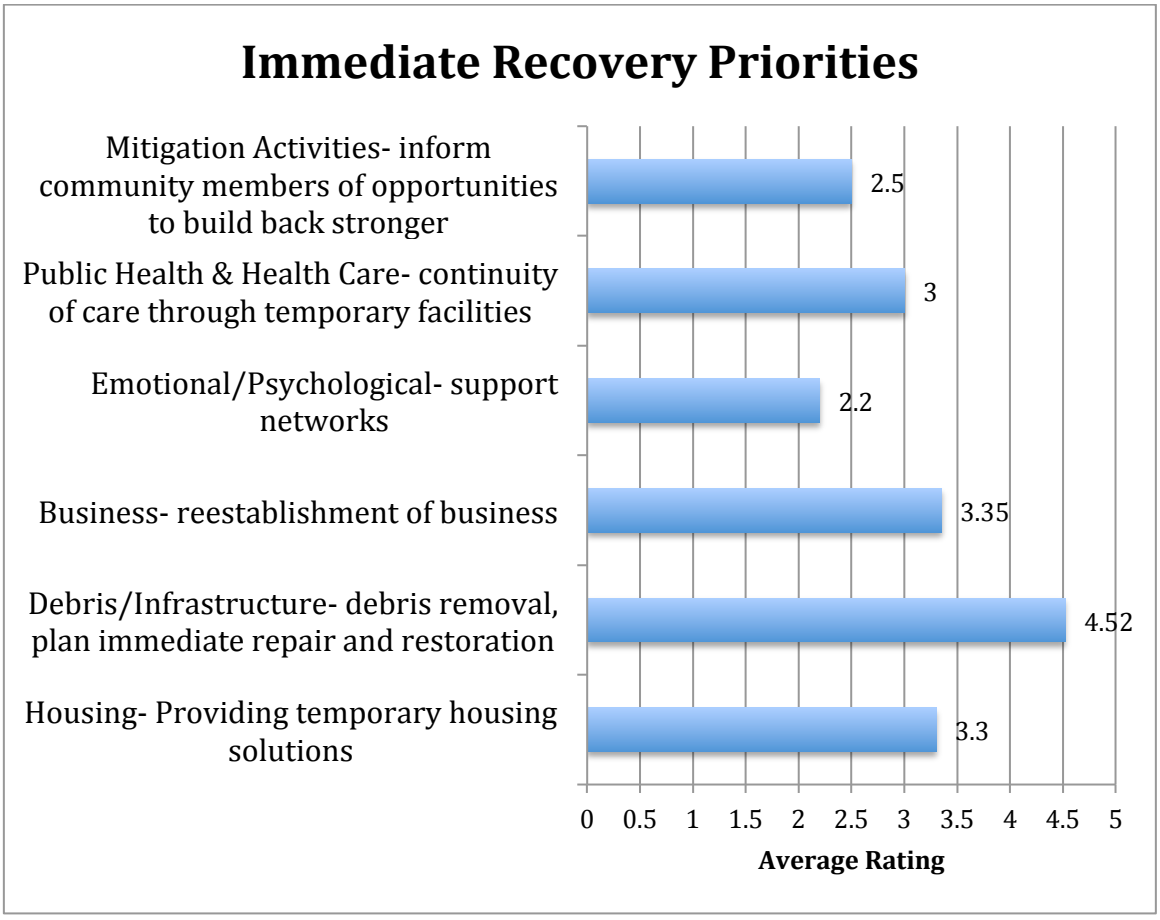


Figure 6.2 Immediate Recovery Activities

The second question of the survey was very similar to the first. It asked the participants to rate the priority level from one to five given within their counties to long-

term recovery activities, as opposed to actions that took place in the immediate aftermath of the storms (Figure 4.2).

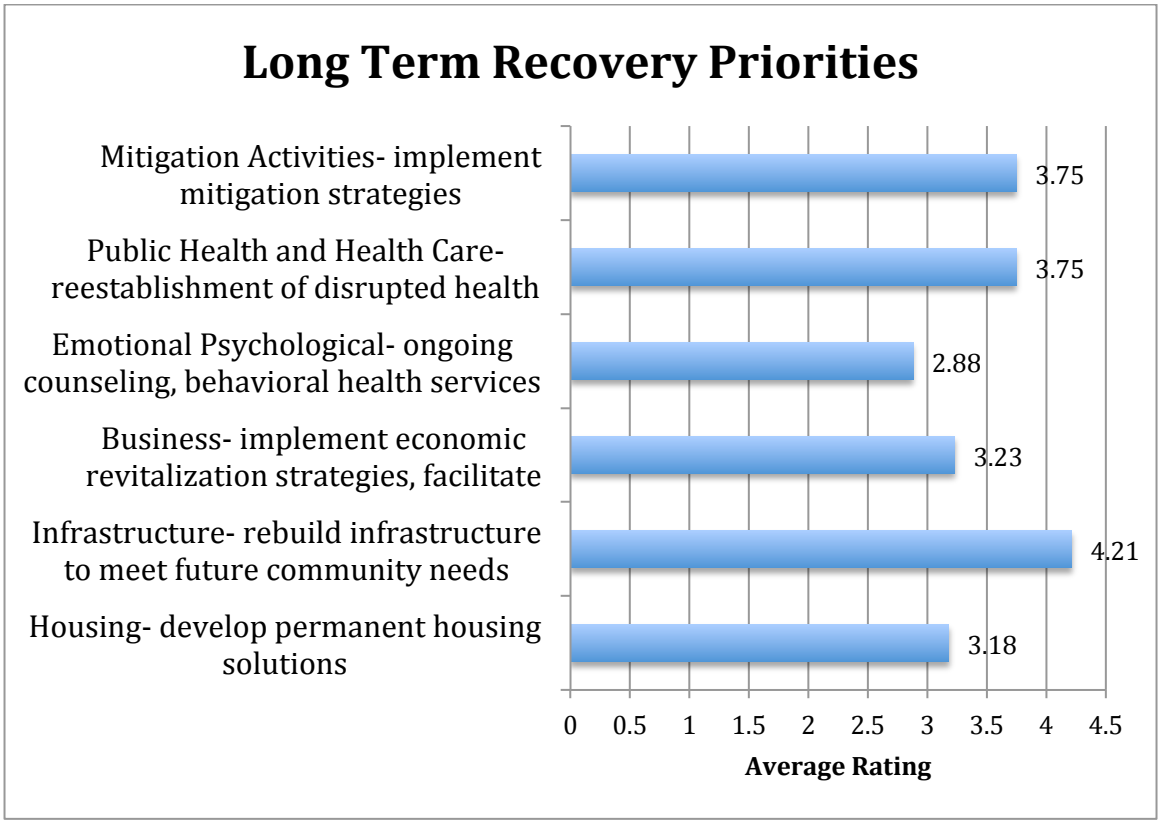


Figure 6.3 Long Term Recovery Activities

I would like to note that for this question, the survey did properly function and allowed participants to rate more than one category as the same priority level. Therefore, there is no issue with the accuracy of these results. Within the long-term frame of mind, the Infrastructure category was rated highest, with an average rating of 4.21. The Mitigation Activities and Public Health and Health Care categories were received the next highest rating, each with an average of 3.75. The Business category, which includes actions such as economic revitalization, was given an average rating of 3.23. Housing-related actions, such as developing permanent housing solutions, were given a 3.18 rating on average. Finally, the lowest average rating was given to the Emotional/Psychological category, with a rating

of 2.88. The results of this question differ from those of the first, particularly in that the average ratings were more centralized and homogeneous. None were as low or high as the average rating given to recovery activity categories in the first question. This implies that the long-term recovery differed from location to location, but short term is about the same everywhere. This makes sense since in the immediate aftermath of a major disaster the first thing local governments will want to do is get the roads and power lines repaired so that rescue and other recovery activities can take place.

For the third question, the survey participants were asked to choose which recovery activities were more successfully achieved overall, immediate, long-term, or both equally (Figure 4.3). Both long-term and immediate recovery activities were indicated 48.5% of the time as which phase was more successfully carried out following the hurricanes of 2005. Obviously, there are a plethora of reasons for why this is so, including varying amounts of resources and preparation for such an event. Only 3% of respondents felt that both phases of the recovery were equally successful. This means there is obviously much room for improvement within the field of disaster recovery, as ideally both phases would be successful and not one or the other. It is also interesting that more respondents did not indicate the short-term recovery as more successful considering that FEMA PA funds pay 100% of short term projects, granted that the local government was able to successfully get the project approved. This leads to the final survey question.

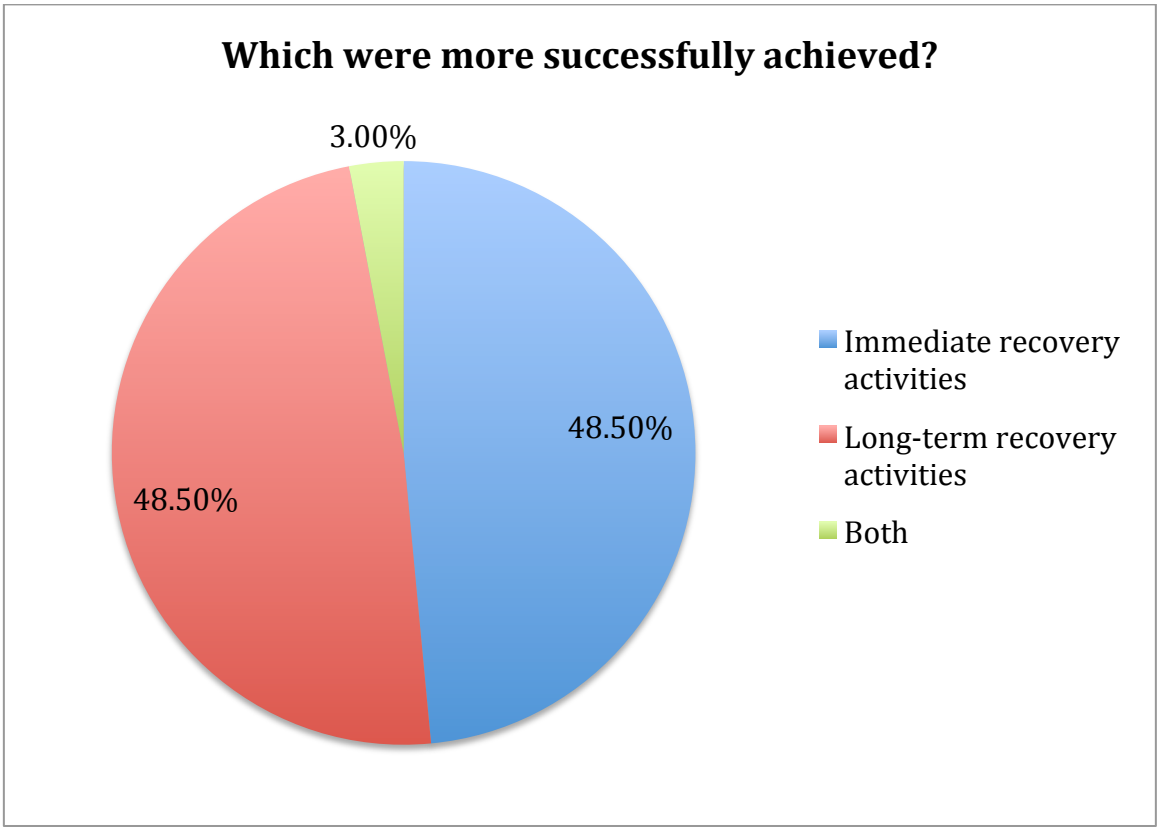


Figure 6.4 Immediate Recovery vs. Long-Term Recovery

In the fourth and final question of the survey, besides the comment section at the end, the participants were requested to indicate which of a list of common issues their county government experienced during the recovery process from the 2005 hurricanes. These common problems were adapted from a GulfGov report (Pike, 2007) that outlined some of the issues experienced during the recovery process in Mississippi and Louisiana following Hurricane Katrina. Because Hurricanes Katrina, Rita, and Wilma occurred so closely together, spatially and temporally, it is safe to assume these issues could have been experienced outside of Louisiana and Mississippi. That is why they were included in my survey.

The list of common issues and results for this question can be seen in Figure 6.4 below. The most common issue, of those listed, and indicated by nearly 70% of

respondents, was the ability of the county governments to get firm commitments from FEMA regarding the eligibility of a given project for federal funding. Because the Public Assistance program is designed as a cost reimbursement process, it can be extremely difficult for a local government, particularly in a less wealthy area, to begin working on a project if there is uncertainty about the project's eligibility for funding. Also, sometimes a project will be deemed ineligible after the initial phases of the project have already been started and this will leave the state trying to come up with the money to repay the federal government.

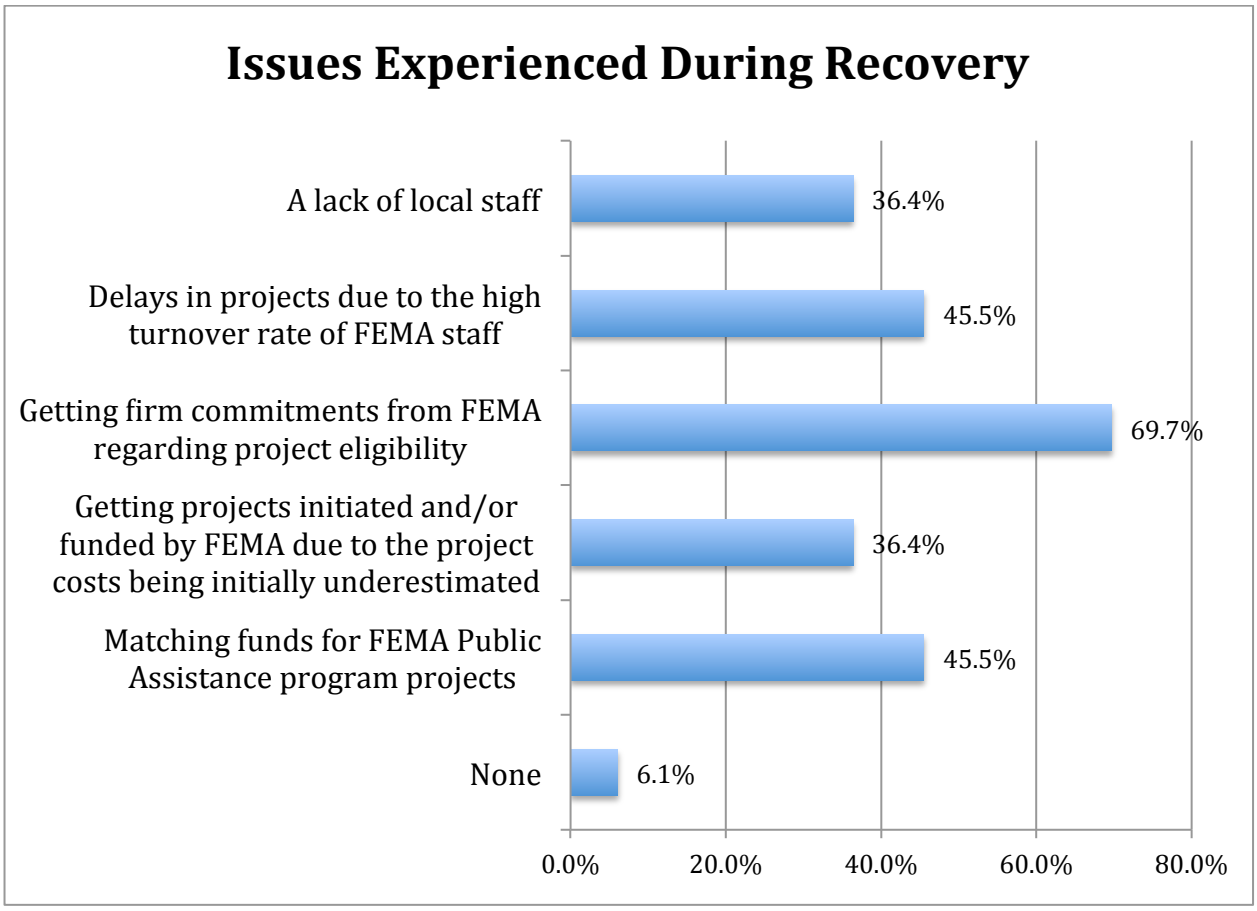


Figure 6.5 Local Government Obstacles

All the other issues listed in the question were indicated by about 35% to 46% of respondents and will now be discussed individually. Some local governments, particularly in rural areas, have smaller staffs and will, in some cases, appoint the same person for multiple positions within the county government. For example, the County Judge may also serve as the Director of the County Emergency Management Agency. This can become problematic in the event of a large disaster event where there is a lot of paperwork and other responsibilities required of the local government staff. 36.4% of respondents indicated that a "lack of local staff" was an issue they experienced during the recovery from Hurricane Katrina, Rita, or Wilma. The second issue listed, "Delays in projects due to the high turnover rate of FEMA staff", was designated by 45.5% of survey participants as an issue they dealt with during the recovery process. According to the GulfGov report *Spending Federal Disaster Aid* (Pike, 2007), local government in Louisiana and Mississippi, where their study took place, indicated that the high rate of FEMA staff turnover caused several issues for the local government. These included delays in projects, construction, and cost estimation inaccuracies. Since almost 50% of respondents had this issue as well, it is safe to say it was not limited to just Mississippi and Louisiana.

According to the survey participants, "getting projects initiated and/or funded by FEMA due to the project costs being initially underestimated" was a common issue faced by local government, as indicated by 36.4% of respondents. This issue occurs usually when the FEMA staff estimate the overall costs of a particular project and have that estimated amount approved for use by the local government and it ends up being considerably lower than the amount the project ends up being contracted for. Some counties saw project costs underestimated by as much as 300% of the actual costs. This, like many other of the

problems faced by the local staff, leads to the government having to pay for things they simply do not have the money for at that time (Pike, 2007). A related issue, "matching funds for FEMA Public Assistance program projects," was problematic in 45.5% of respondents' county governments. As part of the Public Assistance program, local governments are expected to pay 10% of project costs when it has been at least six months since the disaster. This way, the federal government covers 100% of immediate emergency recovery actions, such as debris removal, but less when it comes time for long-term projects, such as rebuilding schools and other buildings. However, in the past, this deadline requirement has been waived in the event of extreme events, like 9/11 and Hurricane Andrew. In the case of Hurricane Katrina in particular, the deadline was not waived until May 2007, a year and eight months after the disaster occurred. This left many governments without adequate funds and led many to set aside CDBG finds, which would otherwise have gone to help individuals, to use for Public Assistance projects (Pike, 2007). Finally, a mere 6.1% of respondents indicated that "None" of the issues I listed for them were experienced by their local government during the recovery from these storms. That means about 2 of the 33 participants chose this answer. The other 31 participants felt they had experienced one of the five issues listed which indicates the importance of addressing these issues.

CHAPTER 7: CONCLUSIONS

This research has given insight into the factors that affected FEMA Public Assistance fund expenditure following the hurricanes of 2005 in the Gulf Coast. Although there is not a large body of existing research on this topic, relevant research suggests that those who are socially marginalized were disproportionately affected by the storm in terms of not being able to successfully pull their lives back together. The significant negative correlation between the percentage of poverty-stricken families and the amount of PA funds given within the county supports this research. This is a disheartening finding, but suggests there is much room for improvement in the management of federal disaster aid dollars to ensure that those most in need are provided for in the event of another large natural disaster.

The strong positive correlation between the percentage of severely damaged houses and the amount of PA expenditure is not surprising and shows that the FEMA staff appropriately allocates money to where it is needed. Because the state government makes the decisions about where money is sent within the state, this result also suggests the level of damage within a county was taken into serious consideration before money was spent there. Although damage should be one of the criteria for Public Assistance eligibility, other factors should be taken into consideration as well. Considering that poverty negatively affected a county's federal aid, it appears this is not what happened. This is disheartening considering that wealthier populations are more likely to have insurance and other financial safety nets. In the future, FEMA should consider some of the underlying limitations on some portions of the affected area that could be hindering a population's ability to deal with the disaster and get aid for themselves and their families.

This study also supports the findings of Sobel et al. (2007) by finding no significant correlation between a state's presence on congressional FEMA oversight committees and federal aid dollar distribution. This suggests that the issue of political influences on FEMA aid money has been improved. However, given the vast amount of complaints that were given by the local governments, it seems there are still bureaucratic limitations of FEMA that may have been exacerbated by their reorganization and inclusion into the Department of Homeland Security in 2003 that caused delays in funding, FEMA staff turnover, and a lack of accountability in their spending.

This study has also given insight into the handling of the recovery process at a local level. According to the results of the survey, infrastructure was given the highest priority overall during the short- and long-term recovery phases. This is what most citizens of an affected community would expect. Without the removal of debris and repairing of electrical lines, basic needs of the community cannot be met. The "Emotional/Psychological" category of recovery activities was given the least amount of attention following these storms in both the long- and short- term recovery phases. This may suggest a need for the introduction of additional emotional support systems to alleviate some of the long-term mental health effects of such devastating natural disasters. Because 97% of survey respondents indicated that either short-term or long-term recovery activities were more completed, and there was not more indicating that both were successful, this study suggests that local governments could benefit from clearly defined goals and objectives following a large disaster event so that they could make sure to allocate resources appropriately in order to accomplish all that is necessary.

One shortcoming of this study was the time that has passed since the event being examined. This could have affected, for example, the response to the survey, since some local officials may not have been employed in their current position at the time of the 2005 hurricane season eight years ago. Also, it is obviously unfortunate that the survey instrument did not properly function and therefore limited the analysis of the survey results. More insights could have been gained from the survey responses if this had not occurred.

For future policy development, policy makers should consider adopting institutional structures and policies that boost community engagement and draw from local knowledge. There should also be attention given to the development of relationships between community organizations and government. These relationships could allow aid to be provided to vulnerable populations through organizations they already know and trust in order to better serve local recovery needs and build trust between government and vulnerability communities. This development of relationships could also help to encourage local institutions to take a more proactive role in disaster preparedness.

In general, the responsibility of disaster recovery should be shifted towards the state and local governments to help alleviate turf wars within the Department of Homeland Security and better prepare everyone for increasingly complex environmental threats. This could include the States' development of programs like Public Assistance so that in the event of a large natural disaster, they are able to effectively and efficiently respond to their citizens who are in need. Obviously, there are certain limitations in the capacities of State governments to handle these disasters alone, but the federal government should develop incentives for the States to take a more proactive role in preparation and mitigation to

these disasters. It also needs to be recognized that future planning and development within environmentally vulnerable areas, such as the Gulf Coast, needs to fully acknowledge and incorporate the fact that environmental disasters are the result of failures in the governance of both human and natural systems, and they need to be treated as such.

Future research on this topic should aim to make comparisons between the unique 2005 hurricane season and other, more standard hurricanes that have occurred along the Gulf Coast in order to determine if there is adaptation going on that is better preparing us for future events. It would also be very useful to compare recovery between geographic locations that have experienced similar disturbances, such as the Northeast and their experiences following Superstorm Sandy in the fall of 2012. A third potential direction for future research is to examine specifically what the federal disaster aid was spent on to determine how much of those expenditures are helping communities along the Gulf Coast to adapt to the changing, and increasingly complex, natural disasters faced by all of us in the face of climate change.

REFERENCES

Boettke, P., E. Chamlee-Wright, P. Gordon, S. Ikeda, P. T. Leeson, R. Sobel. (2007). *The political, economic, and social aspects of Hurricane Katrina.* Southern Economic Journal. 74(2). 363-376.

Bullard, R. D., and B. Wright. "Introduction". *Race, Place, and Environmental Justice After Hurricane Katrina.* Ed. R. D. Bullard and B. Wright. Boulder: Westview Press, 2009. 1-18.

Cox, R. S., and K. E. Perry. (2011). *Like a fish out of water: Reconsidering disaster recovery and the role of place and social capital in community disaster resilience.* American Journal of Community Psychology. 48(3-4). 395-411.

Cutter, S. L., B. J. Boruff, and W. L. Shirley. (2003). *Social vulnerability to environmental hazards.* Social Science Quarterly. 84(2). 242-261.

Cutter, S. L., C. T. Emerich, J. T. Mitchell, B. J. Boruff, M. Gall, M. C. Schmidtlein, C. G. Burton, and G. Melton. (2006). *The long road home: Race, class, and recovery from Hurricane Katrina.* Environment. 48(2). 8-20.

Data.gov Program Management Office. (2012). *Public Assistance Subgrantee Summary.* Retrieved from http://www.data.gov.

Elliott, J. R. and J. Pais. (2006). *Race, class, and Hurricane Katrina: Social differences in human responses to disaster.* Social Science Research. 35. 295-321.

Field, A. (2009). *Discovering Statistics with SPSS.* SAGE Publications. London.

Garrett, T. A. and R. S. Sobel. (2003). *The political economy of FEMA disaster payments.* Economic Inquiry. 41(3). 496-509.

Guleria, S. and J. K. P. Edward. (2012). *Coastal community resilience: Analysis of resilient elements in 3 districts of Tamil Nadu State, India.* Journal of Coastal Conservation. (16), 101-110.

Gunderson, L. (2010). *Ecological and human community resilience in response to natural disasters.* Ecology and Society. 15(2). 18.

Henkel, K. E., J. F. Dovidio, and S. L. Gaertner. (2006). *Institutional racism, individual racism, and Hurricane Katrina.* Analyses of Social Issues and Public Policy. 6(1). 99-124.

Herron, J., and M. W. Smith. (2012). *The disaster of Hurricane Katrina: Malfeasance, official deviance and the failure to serve and protect a community.* The International Journal of Interdisciplinary Social Sciences. 6(5). 127-139.

Hooks, J. P., and T. B. Miller. (2006). *The continuing storm: How disaster recovery excludes those most in need.* California Western Law Review. 43(1). 21-73.

Jurkiewicz, C.L. (2009). *Political leadership, cultural ethics, and recovery: Louisiana post-Katrina.* Public Organizational Review. (9) 353-366.

Kates, R.W., C.E. Colton, S. Laska, and S. P. Leatherman. (2006). *Reconstruction of New Orleans after Hurricane Katrina: A research perspective.* Proceedings of the National Academy of Sciences. 103(40). 14653-14660.

Krueger, A. B. "At FEMA, Disasters and Politics Go Hand in Hand." *The New York Times* September 15, 2005. Web. February 17, 2013.

Manyena, S. B., G. O'Brien, P. O'Keefe, and J. Rose. (2011). *EDITORIAL: Disaster resilience: a bounce back or bounce forward ability?* Local Environment. 16(5). 417-424.

Masozera, M., M. Bailey, and C. Kerchner. (2007). *Distribution of impacts of natural disasters across income groups: A case study of New Orleans.* Ecological Economics. (63). 299-306.

Patterson, O., F. Weil, and K. Patel. (2010). *The role of community in disaster response: Conceptual models.* Population Research and Policy Review. (29). 127-141.

Redlener, I. (2008). *Population vulnerabilities, preconditions, and the consequences of disasters.* Social Research. 75(3). 785-792.

Roberts, P. S. (2006). *FEMA after Katrina.* Policy Review. (137). 15-33.

Rugani, L. "Improved disaster resilience is imperative for U.S.; National resilience vision and culture of resilience are both needed, new report says." *News from the National Academies*. August 1, 2012. National Academies. October 16, 2012 http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=13457.

Sherrieb, K., F, H. Norris, and S. Galea. (2010). *Measuring capacities for community resilience.* Social Indicators Research. 99. 227-247.

Singer, P. (2006). *Uneasy money.* National Journal. 38(32-34). 22-30.

Sobel, R.S., C. J. Coyne, and P.T. Leeson. (2007). *The political economy of FEMA: Did reorganization matter?* Journal of Public Finance and Public Choice. 17 (2-3). 49-65.

Strømsnes, K. (2008). *The importance of church attendance and membership of religious voluntary organizations for the formation of social capital.* Social Compass. 55(4). 478-496.

Tierney, K., (2012). *Disaster governance: Social, political, and economic dimensions.* Annual Review of Environment and Resources. (37) 341-363.

Toldson, I. A., K. Ray, S. S. Hatcher, and L. S. Louis. (2011). *Examining the long-term racial disparities in health and economic conditions among hurricane Katrina survivors: Policy implications for Gulf Coast recovery.* Journal of Black Studies. (42) 360-375.

Turner II, B. L., R. E. Kasperson, P. A. Matson, J. J. McCarthy, R. W. Corell, L. Christensen, N. Eckley, J. X. Kasperson, A. Luers, M. L. Martello, C. Polsky, A. Pulsipher, and A. Schiller. (2003). *A framework for the vulnerability analysis in sustainability science.* Proceedings of the National Academy of Science. 100(14). 8074-8079.

U. S. Census Bureau. (2012). *USA Counties 2000.* Retrieved from http://www.censtats.census.gov.

U. S. Congressional Research Service. Federal Stafford Act Disaster Assistance: Presidential Declarations, Eligible Activities, and Funding (RL33053; June 7, 2011), by Francis X. McCarthy.

U. S. Congressional Research Service. Stafford Act Declarations 1953-2011: Trends and Analyses, and Implications for Congress (R42702; August 31, 2012), by Bruce R. Lindsay and Francis X. McCarthy.

U. S. Department of Housing and Urban Development Office of Policy Development and Research. *Current Housing Unit Damage Estimates: Hurricanes Katrina, Rita, and Wilma.* Washington, D.C.: Government Printing Office, 2006.

U. S. Government Accountability Office. *Disaster Relief: Governtmentwide Framework Needed to Collect and Consolidate Information to Report on Billions in Federal Funding for the 2005 Gulf Coast Hurricanes.* Washington, D.C.: Government Printing Office, 2006.

U. S. Government Printing Office. *2005-2006 Official Congressional Directory 109th Congress.* Washington, D.C.: 2005. (S. Pub. 109-12).

Waugh Jr., W. L. (2009). *Katrina and the governors.* Public Organizational Review. (9). 343-351.

Waugh Jr., W. L. and R. B. Smith. (2006). *Economic development and reconstruction on the Gulf after Katrina.* Economic Development Quarterly. 20(3). 211-218.

Wilby, R. L., and R. Keenan. (2012). *Adapting to flood risk under climate change.* Progress in Physical Geography. 36(3). 348-378.

APPENDIX A: SURVEY MATERIALS

Survey Consent

1. Performance Site: Louisiana State University and Agricultural and Mechanical College

2.Investigators: The following investigator is available for questions about this study at any time: Pamela Golden, pcamilleg@gmail.com

3.Purpose of this Study: The purpose of this research project is to determine potential factors that affect recovery from hurricanes across the Gulf Coast.

4. Subject Inclusion: County Administrators in Texas, Louisiana, Mississippi, Alabama, and Florida

5. Number of Subjects: 136

6. Study Procedures: A governmental leader from each county will be asked to complete a brief, 6 question survey.

7. Benefits: This survey may yield valuable information regarding recovery across the Gulf Coast.

8. Risks: There are no risks associated with this survey.

9. Right to Refuse: Subjects may choose not to participate or to withdraw from the study at any time without penalty or loss of any benefit to which they might otherwise be entitled.

10. Privacy: Results of this study may be published, but no respondent names or identifying information will be included in the publication. Subject identity will remain confidential unless disclosure is required by law.

11. Consent: You may direct additional questions regarding study specifics to me or my major professor, Margaret Reams, Associate Professor, Department of Environmental Sciences, Louisiana State University, (225) 578-4299, mreams@lsu.edu. If you have questions about subjects' rights or other concerns, you may contact Robert C. Mathews, Institutional Review Board, (225) 578-8692, irb@lsu.edu, www.lsu.edu/irb.

By completing this survey you consent to the above information. Thank you for your participation.

Print Version of Survey

1. Please enter the name of your county and state.

2. In terms of the weeks and months following Hurricane(s) Katrina, Rita, and/or Wilma (whichever affected your county), please rate the degree to which the following recovery activity categories were prioritized from 1 to 5 with 1 being a very low priority and 5 being a very high priority:
Housing- providing temporary housing solutions
Debris/Infrastructure- debris removal, plan immediate repair and restoration
Business- reestablishment of business
Emotional/Psychological- support networks
Public Health & Health Care- continuity of care through temporary facilities
Mitigation Activities- inform community members of opportunities to build back stronger

3. In terms of the months and years following Hurricane(s) Katrina, Rita, and/or Wilma (whichever affected your county), please rate the degree to which the following recovery activity categories were prioritized from 1 to 5 with 1 being a very low priority and 5 being a very high priority:
Housing- develop permanent housing solutions
Infrastructure- rebuild infrastructure to meet future community needs
Business- implement economic revitalization strategies, facilitate funding to business rebuilding
Emotional Psychological- ongoing counseling, behavioral health services
Public Health and Health Care- reestablishment of disrupted health care facilities
Mitigation Activities- implement mitigation strategies

4. Overall, in terms of activities during the immediate and long-term recovery processes following the 2005 hurricane season, which were more successfully recovered?
Immediate recovery activities or long-term recovery activities

5. During the recovery process following the 2005 hurricane season, which of the following issues did your county administrators experience? (or say: to what degree did this issue hinder your county's ability to successfully recover)
-Matching funds for FEMA Public Assistance program projects
-Getting projects initiated and/or funded by FEMA due to the project costs being initially underestimated
-Getting firm commitments from FEMA regarding project eligibility
-Delays in projects due to the high turnover rate of FEMA staff
-A lack of local staff

6. Thank you for your time. Please enter any additional comments you may have below.

Application for Exemption from Institutional Oversight

Institutional Review Board
Dr. Robert Mathews, Chair
131 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu
lsu.edu/irb

Unless qualified as meeting the specific criteria for exemption from Institutional Review Board (IRB) oversight, ALL LSU research/ projects using living humans as subjects, or samples, or data obtained from humans, directly or indirectly, with or without their consent, must be approved or exempted in advance by the LSU IRB. This Form helps the PI determine if a project may be exempted, and is used to request an exemption.

– Applicant,Please fill out the application in its entirety and include the completed application as well as parts A-F, listed below, when submitting to the IRB. Once the application is completed, please submit two copies of the completed application to the IRB Office or to a member of the Human Subjects Screening Committee. Members of this committee can be found at http://research.lsu.edu/CompliancePoliciesProcedures/InstitutionalReviewBoard%28IRB%29/item24737.html

– A Complete Application includes All of the Following:
(A) Two copies of this completed form and two copies of parts B thru F.
(B) A brief project description (adequate to evaluate risks to subjects and to explain your responses to Parts 1&2)
(C) Copies of all instruments to be used.
*If this proposal is part of a grant proposal, include a copy of the proposal and all recruitment material.
(D) The consent form that you will use in the study (see part 3 for more information.)
(E) Certificate of Completion of Human Subjects Protection Training for all personnel involved in the project, including students who are involved with testing or handling data, unless already on file with the IRB. Training link: (http://phrp.nihtraining.com/users/login.php)
(F) IRB Security of Data Agreement: (http://research.lsu.edu/files/item26774.pdf)

1) Principal Investigator: Pamela Camille Golden **Rank:** student

Dept: Environmental Sciences **Ph:** 601-209-2396 **E-mail:** pcamilleg@gmail.com

2) Co Investigator(s): please include department, rank, phone and e-mail for each
*If student, please identify and name supervising professor in this space

Margaret Reams, Associate Professor, (225) 578-4299, mreams@lsu.edu

IRB# E 7080 LSU Proposal #

✓ Complete Application

✓ Human Subjects Training

3) Project Title: Explaining Success and Variation of Recovery Fund Distribution Following Hurricanes Katrina, Rita, and Wilma on the Gulf Coast

Study Exempted By:
Dr. Robert C. Mathews, Chairman
Institutional Review Board
Louisiana State University
203 B-1 David Boyd Hall
225-578-8692 | www.lsu.edu/irb
Exemption Expires: 10/16/2015

4) Proposal? (yes or no) no **If Yes, LSU Proposal Number**

Also, if YES, either ○ **This application completely matches the scope of work in the grant**

OR ○ **More IRB Applications will be filed later**

5) Subject pool (e.g. Psychology students) County Administrators

*Circle any **"vulnerable populations" to be used**: (children <18; the mentally impaired, pregnant women, the ages, other). Projects with incarcerated persons cannot be exempted.

6) PI Signature Pamela Golden **Date** 10/16/2012 (no per signatures)

**** I certify my responses are accurate and complete.** If the project scope or design is later changes, I will resubmit for review. I will obtain written approval from the Authorized Representative of all non-LSU institutions in which the study is conducted. I also understand that it is my responsibility to maintain copies of all consent forms at LSU for three years after completion of the study. If I leave LSU before that time the consent forms should be preserved in the Departmental Office.

Screening Committee Action: Exempted 1 Not Exempted ____ Category/Paragraph 2

Signed Consent Waived?: (Yes) / No

Reviewer Mathews **Signature** Robert Mathews **Date** 10/17/12

Open Ended Comments from Survey (unedited)

Q1. Thank you for your time. Please enter any additional comments you may have below.		
1	The first set of ratings would not let me use "top" or "high" more than once, but several of the items were running as top and high priorities con-currently.	Dec 10, 2012 2:12 PM
2	Question #2 was not functioning properly, so we simply skipped it to not unnecessarily skew results. The most significant impact to Harris County from Katrina was sheltering Louisiana victims. The most significant impact from Rita was the evacuation (property and infrastructure damage was not that significant). Wilma had little if no impact at all.	Nov 28, 2012 7:16 AM
3	The on-line survey form would not allow me to accurately answer question #2.	Nov 15, 2012 12:33 PM
4	I was not working for Brevard County EM until 2006. My answers are based on information I may have found during my work.	Nov 13, 2012 12:32 PM
5	The 2005 Hurricanes did particularly heavy damage in Louisiana and therefore the recovery process has been a long process due to the astronomical numbers of projects generated from these storms.	Nov 13, 2012 8:51 AM
6	the first question - I was not able to rank each of the items listed - all of them were a top priority for us. we were very successful in our efforts due to the fact that we had already solicited contracts through our bidding process so we were ready to move forward and reimbursements from FEMA reasonalbe due to our being ready.	Nov 13, 2012 7:28 AM

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **pamela golden** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 10/15/2012

Certification Number: 1028565

APPENDIX B: VARIABLES

STATE	COUNTY	PERCAPFEMA	PERSVRDAM	POPSQMILE	CONGRESS	MSA	PERPOV	PCTMOBILE	AGE
Florida	Brevard	30.90	0.1	467.8	3	1	28.01	5.06	41.4
Florida	Broward	299.96	1.3	1346.9	3	1	25.51	1.65	37.8
Florida	Collier	305.69	0.5	124.1	3	1	28.57	4.29	44.1
Florida	Glades	109.60	2.3	13.7	3	0	26.51	30.07	40.2
Florida	Hendry	137.47	5.6	31.4	3	0	22.92	14.68	29.5
Florida	Highlands	5.51	0	85	3	0	29.78	15.44	50
Florida	Indian River	28.14	0.1	224.5	3	1	29.13	6.01	47
Florida	Lee	58.00	0.1	548.4	3	1	29.13	8.64	45.2
Florida	Martin	119.51	0.3	227.9	3	1	28.80	6.02	47.3
Florida	Miami-Dade	250.57	0.6	1157.9	3	1	24.52	0.68	35.6
Florida	Monroe	881.38	11.3	79.8	3	0	25.96	12.33	42.6
Florida	Okeechobee	26.05	0.9	46.4	3	0	25.53	21.25	36.7
Florida	Palm Beach	208.91	0.9	573	3	1	27.05	1.78	41.8
Florida	St. Lucie	87.47	0.3	336.9	3	1	28.18	6.02	42
Louisiana	Acadia	62.07	2.4	89.9	1	0	26.78	6.49	33.7
Louisiana	Allen	79.90	2.4	33.3	1	0	23.68	6.54	34.8
Louisiana	Ascension	37.51	0.5	262.4	1	1	27.41	9.39	32
Louisiana	Assumption	39.14	1.9	69	1	0	26.82	12.54	34.2
Louisiana	Beauregard	61.96	4.2	28.4	1	0	27.57	11.75	35.5
Louisiana	Calcasieu	511.10	9.3	171.4	1	1	26.83	7.47	34.5
Louisiana	Cameron	16691.08	71.8	7.6	1	1	27.05	15.85	35
Louisiana	E. Baton Rouge	3772.51	0.2	907.4	1	1	25.03	1.39	31.5
Louisiana	E. Feliciana	73182.24	0.6	47.2	1	1	23.69	10.78	35.8
Louisiana	Evangeline	52.24	0.4	53.4	1	0	26.14	5.09	33.7
Louisiana	Iberia	192.16	5	127.4	1	0	26.10	8.09	33.3
Louisiana	Iberville	65.41	0.7	53.8	1	1	24.09	8.00	34.4

STATE	COUNTY	PERCAPFEMA	PERSVRDAM	POPSQMILE	CONGRESS	MSA	PERPOV	PCTMOBILE	AGE
Louisiana	Jefferson	1067.36	19.5	1483.6	1	1	26.53	0.77	35.9
Louisiana	Jefferson Davis	119.98	4.1	48.2	1	0	27.40	6.71	34.5
Louisiana	Lafayette	66.26	0.2	705.6	1	1	25.78	4.92	32.4
Louisiana	Lafourche	269.91	1.7	82.9	1	1	27.14	6.92	34.1
Louisiana	Livingston	54.09	1.1	141.7	1	1	27.95	12.63	32.8
Louisiana	Orleans	5594.04	55.9	2677.8	1	1	23.51	0.15	33.1
Louisiana	Plaquemines	29086.21	57.5	31.7	1	1	26.11	12.34	33.7
Louisiana	Pointe Coupee	30.11	0.2	40.9	1	1	27.31	9.81	36.7
Louisiana	Rapides	31.90	0	95.5	1	1	26.39	5.61	35.5
Louisiana	Sabine	14.42	0.5	27.1	1	0	28.30	24.72	38.2
Louisiana	St. Bernard	23900.26	78.4	144.6	1	1	27.31	3.14	36.6
Louisiana	St. Charles	413.85	2.4	169.3	1	1	27.42	3.97	34.2
Louisiana	St. Helena	90.45	2	25.8	1	1	26.34	17.59	35
Louisiana	St. James	129.87	1.2	86.2	1	0	26.23	7.48	34
Louisiana	St. John the Baptist	87.90	1.9	196.5	1	1	26.36	4.55	32
Louisiana	St. Landry	24.85	0.3	94.4	1	0	26.64	7.14	34.6
Louisiana	St. Martin	17.77	0.6	65.7	1	1	26.71	11.24	33.4
Louisiana	St. Mary	95.71	1.6	87.3	1	0	26.34	8.66	34.3
Louisiana	St. Tammany	2164.98	25.5	224	1	1	27.69	4.51	36.3
Louisiana	Tangipahoa	166.88	2.3	127.3	1	0	25.74	9.70	32.3
Louisiana	Terrebonne	99.73	6.7	83.3	1	1	26.29	6.72	33
Louisiana	Vermilion	876.60	13	45.8	1	0	26.97	8.53	35.1
Louisiana	Vernon	39.43	1.3	39.6	1	0	26.42	9.03	28.3
Louisiana	Washington	2717.30	8.4	65.6	1	0	26.56	8.08	36.1
Louisiana	W. Baton	50.81	0.2	113.1	1	1	26.69	9.73	34

STATE	COUNTY	PERCAPFEMA	PERSVRDAM	POPSQMILE	CONGRESS	MSA	PERPOV	PCTMOBILE	AGE
Louisiana	W. Feliciana	27.82	0.1	37.2	1	1	18.02	7.54	36.6
Mississippi	Adams	10.44	0.3	74.7	2	0	27.64	4.70	38.1
Mississippi	Amite	12.58	0.3	18.6	2	0	28.64	13.82	38.3
Mississippi	Attala	11.54	0.1	26.7	2	0	27.55	8.64	37.3
Mississippi	Choctaw	19.18	0.2	23.3	2	0	27.18	8.33	36.9
Mississippi	Claiborne	57.17	0.6	24.3	2	0	21.55	10.75	25.6
Mississippi	Clarke	52.15	1.7	26	2	0	28.07	12.52	36.8
Mississippi	Copiah	27.72	0.6	37	2	1	26.37	8.65	34
Mississippi	Covington	192.57	2.6	46.9	2	0	27.43	12.66	33.8
Mississippi	Forrest	256.52	4.1	155.5	2	1	24.08	4.20	29.7
Mississippi	Franklin	8.94	0.2	15	2	0	27.92	13.57	37
Mississippi	George	130.39	6.5	40.1	2	1	27.84	9.73	33.3
Mississippi	Greene	1216.42	3.4	18.7	2	0	23.70	11.50	32.4
Mississippi	Hancock	12737.00	69.8	90.1	2	1	27.65	9.20	38.5
Mississippi	Harrison	6110.78	34.2	326.3	2	1	25.83	5.19	33.9
Mississippi	Hinds	34.66	0.3	288.6	2	1	25.05	1.58	31.9
Mississippi	Holmes	20.09	0.3	28.6	2	0	24.54	10.48	29.7
Mississippi	Humphreys	36.51	0.2	26.8	2	0	24.75	4.59	30.5
Mississippi	Jackson	2044.99	34.2	180.8	2	1	27.33	5.00	34.7
Mississippi	Jasper	609.46	4.4	26.8	2	0	27.68	11.81	35.1
Mississippi	Jefferson	6.88	1.1	18.8	2	0	23.85	12.91	32.4
Mississippi	jefferson Davis	318.28	1.4	34.2	2	0	27.00	9.46	35
Mississippi	Jones	640.61	4.1	93.6	2	0	27.19	8.63	35.8
Mississippi	Kemper	17.12	0.6	13.6	2	0	26.89	11.39	35.2
Mississippi	Lamar	69.16	5.2	78.6	2	1	27.43	6.29	32.6
Mississippi	Lauderdale	103.58	0.9	111	2	0	26.46	6.64	35
Mississippi	Lawrence	286.09	2.3	30.8	2	0	28.56	10.66	35.8

STATE	COUNTY	PERCAPFEMA	PERSVRDAM	POPSQMILE	CONGRESS	MSA	PERPOV	PCTMOBILE	AGE
Mississippi	Leake	8.41	0.1	35.9	2	0	26.84	8.72	34.8
Mississippi	Lincoln	21.57	0.9	56.6	2	0	27.62	10.03	35.8
Mississippi	Lowndes	13.80	0.1	122.7	2	0	26.77	5.73	32.7
Mississippi	Madison	51.18	0.1	104.1	2	1	26.14	2.87	33.4
Mississippi	Marion	601.34	3.4	47.2	2	0	27.30	8.11	35.1
Mississippi	Neshoba	57.14	0.2	50.3	2	0	27.33	9.09	34.7
Mississippi	Newton	35.55	0.9	37.8	2	0	27.58	9.85	35.1
Mississippi	Noxubee	16.49	0.5	18.1	2	0	25.70	11.61	32.3
Mississippi	Oktibbeha	7.88	0.2	93.7	2	0	21.91	6.70	24.8
Mississippi	Pearl River	2180.09	8.2	60	2	0	28.23	10.08	35.9
Mississippi	Perry	59.23	3.8	18.8	2	1	27.78	13.63	33.5
Mississippi	Pike	67.28	1	95.2	2	0	27.23	8.48	35.2
Mississippi	Rankin	38.74	0.3	148.8	2	1	27.16	7.65	34.6
Mississippi	Scott	30.33	0.5	46.7	2	0	26.82	11.12	33.8
Mississippi	Simpson	164.01	1.1	46.9	2	1	27.11	11.14	35
Mississippi	Smith	80.48	0.7	25.4	2	0	28.67	12.51	35.6
Mississippi	Stone	2528.24	11.2	30.6	2	1	26.80	8.86	33.6
Mississippi	Walthall	157.50	5.1	37.5	2	0	27.27	11.16	35.1
Mississippi	Warren	10.90	0.2	84.6	2	0	26.85	6.71	34.8
Mississippi	Wayne	1251.03	2.6	26.2	2	0	28.09	14.06	33.8
Mississippi	Wilkinson	26.82	0.4	15.2	2	0	24.58	17.22	35
Mississippi	Winston	18.57	0.2	33.2	2	0	27.34	6.71	36.3
Mississippi	Yazoo	15.22	0.2	30.6	2	0	23.79	6.59	33.7
Alabama	Baldwin	198.85	0.5	88	2	1	28.87	9.35	39
Alabama	Choctaw	17.13	0.3	17.4	2	0	28.57	16.84	37.9
Alabama	Clarke	13.43	0.6	22.5	2	0	27.97	13.00	35.5
Alabama	Greene	19.84	0.2	15.4	2	1	26.96	16.33	35.9
Alabama	Hale	4.14	0.1	26.7	2	1	27.06	16.09	34.4

STATE	COUNTY	PERCAPFEMA	PERSVRDAM	POPSQMILE	CONGRESS	MSA	PERPOV	PCTMOBILE	AGE
Alabama	Marengo	10.24	0.1	23.1	2	0	28.12	12.52	36.4
Alabama	Mobile	57.50	2.1	324.3	2	1	26.85	3.85	34.4
Alabama	Pickens	11.15	0.2	23.8	2	0	27.99	12.60	36.9
Alabama	Sumter	15.11	0.3	16.4	2	0	24.85	15.70	32.1
Alabama	Tuscaloosa	10.23	0	124.5	2	1	25.54	6.21	31.9
Alabama	Washington	39.49	1.1	16.7	2	0	28.03	13.81	34.9
Alabama	Wilcox	1.32	0	14.8	2	0	25.80	18.63	33.8
Texas	Angelina	28.88	0.6	99.9	5	0	26.67	8.33	34.2
Texas	Brazoria	8.45	0	174.4	5	1	26.27	5.66	34
Texas	Chambers	77.72	1.4	43.5	5	1	27.74	9.65	35.1
Texas	Fort Bend	1.84	0	405.1	5	1	26.47	1.71	33.3
Texas	Galveston	28.15	0.2	628.5	5	1	26.58	2.66	35.9
Texas	Hardin	440.12	7	53.8	5	1	28.69	12.20	36
Texas	Harris	5.45	0	1966.8	5	1	24.72	1.15	31.2
Texas	Houston	2.34	0	18.8	5	0	24.96	9.34	40.3
Texas	Jasper	265.10	6.7	38	5	0	28.06	12.41	37.3
Texas	Jefferson	343.23	4.9	278.8	5	1	25.53	1.42	35.3
Texas	Liberty	46.53	1.8	60.5	5	1	25.57	12.14	34
Texas	Montgomery	11.84	0.1	281.4	5	1	27.48	7.64	34.4
Texas	Nacodgoches	14.02	0.2	62.5	5	0	23.93	8.68	29.7
Texas	Newton	171.91	6.6	16.2	5	0	27.42	14.23	36.9
Texas	Orange	72.33	7.9	238.7	5	1	28.14	8.05	36.1
Texas	Polk	34.44	1.9	38.9	5	0	26.89	14.82	39.3
Texas	Sabine	65.36	1.4	21.4	5	0	30.31	28.81	47
Texas	San Augustine	170.25	0.6	16.9	5	0	28.99	17.09	42.1
Texas	San Jacinto	19.75	1.6	39	5	1	28.98	16.54	40
Texas	Shelby	23.53	0.2	31.8	5	0	27.66	14.47	36.9

STATE	COUNTY	PERCAPFEMA	PERSVRDAM	POPSQMILE	CONGRESS	MSA	PERPOV	PCTMOBILE	AGE
Texas	Trinity	11.35	0.4	19.9	5	0	29.36	21.42	43.3
Texas	Tyler	1541.92	8.5	22.6	5	0	27.25	12.35	38.9
Texas	Walker	5.03	0.2	78.5	5	0	18.67	8.32	31

APPENDIX C: CORRELATION MATRIX

Correlations

		percapfema	pctsvrdam	pctpov	popsqmile	congress	msa	age	pctmobile
percapfema	Pearson Correlation	1	.422**	-.118	.003	-.165	.194*	.001	-.006
	Sig. (2-tailed)		.000	.173	.970	.056	.024	.994	.946
	N	136	136	136	136	136	136	136	136
pctsvrdam	Pearson Correlation	.422**	1	.010	.203*	-.180*	.258**	-.006	-.103
	Sig. (2-tailed)	.000		.908	.018	.036	.002	.944	.234
	N	136	136	136	136	136	136	136	136
pctpov	Pearson Correlation	-.118	.010	1	-.168	.105	.004	.581**	.254**
	Sig. (2-tailed)	.173	.908		.051	.222	.967	.000	.003
	N	136	136	136	136	136	136	136	136
popsqmile	Pearson Correlation	.003	.203*	-.168	1	.046	.377**	-.027	-.487**
	Sig. (2-tailed)	.970	.018	.051		.598	.000	.753	.000
	N	136	136	136	136	136	136	136	136
congress	Pearson Correlation	-.165	-.180*	.105	.046	1	-.013	.307**	.143
	Sig. (2-tailed)	.056	.036	.222	.598		.880	.000	.098
	N	136	136	136	136	136	136	136	136
msa	Pearson Correlation	.194*	.258**	.004	.377**	-.013	1	.030	-.418**
	Sig. (2-tailed)	.024	.002	.967	.000	.880		.727	.000
	N	136	136	136	136	136	136	136	136
age	Pearson Correlation	.001	-.006	.581**	-.027	.307**	.030	1	.258**
	Sig. (2-tailed)	.994	.944	.000	.753	.000	.727		.002
	N	136	136	136	136	136	136	136	136
pctmobile	Pearson Correlation	-.006	-.103	.254**	-.487**	.143	-.418**	.258**	1
	Sig. (2-tailed)	.946	.234	.003	.000	.098	.000	.002	
	N	136	136	136	136	136	136	136	136

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

VITA

Camille Golden was born in 1988 and grew up in Jackson, Mississippi. As an adolescent, she was always interested in science and environmental issues. In the 5th grade, Camille started an environmental club and was recognized by the Millennium Dreamers Program at Walt Disney World. After graduating from Ridgeland High School in 2007, Camille continued her education at the University of Mississippi in Oxford, Mississippi where she received a Bachelor of Science in Geology and graduated in the spring of 2011. That fall, she came to LSU to pursue her Master's degree in Environmental Science. While at LSU, Camille has participated in the Coast and Environment Graduate Organization and the Environmentors Program. Upon graduation, Camille hopes to begin a career in the Environmental Consulting industry.